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Technical Report

Berenguela Silver-Copper-Manganese Property Update

Aftermath Silver Ltd.

Province of Lampa, Department of Puno, Peru

In accordance with the requirements of National Instrument 43-101 "Standards of Disclosure for Mineral Projects" of the Canadian Securities Administrators

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1 Summary

1.1 General and terms of reference

This Technical Report (Report) on the Berenguela Property (Property) has been prepared by AMC Mining Consultants (Canada) Ltd. (AMC) of Vancouver, Canada on behalf of Aftermath Silver Ltd. (Aftermath or the Issuer), of Vancouver, Canada. This report is an initial report for the Issuer who has completed the initial closing of a transaction to SSR Mining (SSRM). Final closing of the transaction is expected to take place on or before 24 November 2026.

There is an earlier NI 43-101 Technical Report on the Property titled "Technical Report on the Berenguela Property, South Central Peru", prepared for Silver Standard Resources Inc. authored by James A. McCrea, P.Geo., and with a signing date of 26 October 2005. This report has been prepared by AMC in accordance with the requirements of National Instrument 43-101 (NI 43-101) "Standards of Disclosure for Mineral Projects" and the Canadian Securities Administrators (CSA) for lodgement on CSA's System for Electronic Document Analysis and Retrieval (SEDAR). The Issuer is a Canadian junior exploration company focused on silver and is listed as AAG.V on Tier 2 of the TSX.V exchange, and as AAGFF on the OTCQB.

1.2 Property description, ownership, and location

The Property within which the Berenguela project (Berenguela or the Project) is located, is in the province of Lampa in the Republic of Peru. The province of Lampa is located in the department of Puno. The approximate coordinates for the centre of the Property are 8,268,274 mN and 331,860 mE (WGS 84 zone 19), or at a latitude 15°39'30" S and longitude 70°34'06" W. It lies between 4,150 and 4,280 m above sea level (masl) in the Western Cordillera of southern Peru in a geographical terrain known as the altiplano (high plateau). Exploration can be performed year-round as can any future mining activities.

Berenguela is located six kilometres north-east of the town of Santa Lucía, on the boundary between two communities, Cayachira to the east and Andamarca to the west.

The transaction with SSRM is to purchase 100% of the Property through the purchase of SSRM's shares in the Peruvian holding company Sociedad Minera Berenguela S.A. (SOMINBESA). The amended terms of the acquisition include certain staged payments, the completion of a Preliminary Feasibility Study (PFS) and filing on SEDAR of a NI 43-101 Technical Report summarizing the PFS, and the granting of a sliding scale net smelter return (NSR) royalty to SSRM.

There is a total of 17 mining concessions held by SOMINBESA, as recorded on the Public Registry which have a total area of 7,357 ha.

Access to the Property can be made all year round from Juliaca driving SW on highway 34A for about 65 km via Santa Lucía. This trip takes between 45 min to 1 hour. Alternatively, the Property can be reached from Arequipa on highway 34A for about 120 km to Santa Lucía, a trip of about 3 hours.

1.3 History

Berenguela has a long history of exploration and production dating back to Colonial times. Through the first half of the 20th century, Lampa Mining was the main player and directly shipped or operated a plant until cessation of operations in 1965. During that period from 1913 until the cessation of operations, records show that approximately 500,000 tons was mined, and 3.24 million ounces of silver and 3,946 tons of copper produced.

After some options agreements with ASARCO, Cerro de Pasco, and Charter Consolidated, Lampa Mining lost ownership of the Property in 1972 and it reverted to the state. Ownership passed to Minero Peru, a state-owned company. In 1995 a policy of privatization was adopted by the Peruvian ministry responsible for Minero Peru, with the result that the Property was offered for sale. Kappes, Cassiday & Associates (KCA) purchased the Property in 1995 by competitive bid and formed a private Peruvian company, SOMINBESA to manage the project. Following acquisition of the Property, KCA conducted a surface bulk-sampling program between 1995 and 1997, collecting two bulk samples for hydrometallurgical testwork.

In March of 2004, Silver Standard Resources (Silver Standard), now SSRM, entered into an option agreement with SOMINBESA to purchase 100% of the silver resources contained in the Berenguela Project. Between 2004 and 2005 Silver Standard completed the required exploration commitments, by undertaking 222 reverse circulation (RC) drill and a Mineral Resource estimate reported under NI 43-101.

In January 2006 Silver Standard signed a share purchase agreement to acquire 100% of SOMINBESA for aggregate payments of US$2M in cash and US$8M in shares of Silver Standard, with KCA retaining a 2% net NSR on copper production, capped at US$3M.

Silver Standard completed drill programs in 2010 and again in 2015, and in February 2017 announced that it had entered into a definitive agreement to sell 100% of SOMINBESA to Valor Resources Limited (Valor), an Australian listed company. Between 2017 and 2018, Valor completed geochemical surveys, an RC drilling program of 67 holes, and completed a JORC (2012) Mineral Resource estimate and a scoping study.

In January 2019 Valor signed a joint venture option agreement with Kennecott Exploration Company, later assigned to Rio Tinto Mining and Exploration (Rio Tinto). In 2019 Rio Tinto completed four diamond drillholes for 1,427 m, collected 707 geochemical samples, and relogged 15 historical drillholes. In January 2020 Rio Tinto elected to not continue with the option agreement.

In March 2020 Valor was unable to meet required cash payments and SSRM commenced transfer of the ownership of SOMINBESA back to SSRM.

On 1 October 2020 Aftermath announced it had signed an acquisition agreement with SSRM to purchase 100% of the Berenguela silver-copper through the purchase of 100% of the shares in SOMINBESA.

There have been numerous historical estimates but the Qualified Person (QP) has not done sufficient work to classify the historical estimates as current Mineral Resources and the Issuer is not treating the historical estimates as current Mineral Resources.

1.4 Geology and mineralization

The Property is located in the Santa Lucía district, in the Western Cordillera, also known as the Cordillera Occidental, on the western edge of the Andean mountain range. The major tectonic event, the Andino Orogeny, occurred in the Late Cretaceous, continuing into the Early Tertiary, uplifting, and folding pre-Tertiary sedimentary sequences. The Western Cordillera has been formed as a result of convergence, or collisional plate tectonics which has been occurring since the early Mesozoic; whereby the oceanic crust of the Nazca plate is being subducted beneath the South American plate. Extension and subsidence east of the early Andean volcanic arc led to the development of a back-arc basin along the length of the Western Cordillera during the Jurassic. Since then, multiple episodes of sedimentary rock formation and subsequent exhumation and recycling have occurred.

Uplift of fault bound blocks of Jurassic sediments, followed by erosion with the onlap of Cretaceous sequence occurred in the area of the Property. These include the Lower Cretaceous arenites of the Angostura Formation, also referred to as the Huancané Formation, and the carbonates of the Mid-Cretaceous Ayavacas Formation which host the Berenguela mineralization.

The stratigraphy of the central core of the Property, and the location of the known mineralization, is dominated by the lower Ayavacas Formation, where it forms a prominent whale-back ridge that stands above the lower lying pampa. The Ayavacas Formation comprises folded thickly bedded, light grey limestones and dolomitized limestones. Several WNW-trending bodies of black massive, patchy, and fracture-controlled manganese oxide replacement mineralization is emplaced in the folded limestones. Interfingered with the carbonates are thin-bedded claystones and sandstones that generally are reddish in colour; a transitional unit called the Murco Formation. Crystalline gypsum lenses are located with red mudstone along the entire length of the known mineralization.

Conformably underlying the Ayavacas Formation is the Mid-Cretaceous Huancané Formation, consisting of reddish and locally green arenites and evaporites. This formation does not outcrop in the central project area but has been recognized in drill core below the mineralization.

Within the Property, the Ayavacas limestones are strongly folded as a result of a compression event during the Andean Orogeny. The anticlines and synclines have axial planes of trending 105°-120° (WNW-ESE) and appear to be mostly open folds on the basis of the inter-limb angles, although isoclinal folds may also occur locally.

While weathering has resulted in a near surface supergene layer, below, the hypogene sequence appears to be characterized by low temperature hydrothermal facies.

The limestones of the Ayavacas Formation at the deposit have been dolomitized to some extent, and then replaced to varying degrees by manganese. Manganese occurs as massive replacements, forming solid manganese mineralization or as manganese oxide fracture infill in carbonate.

The main manganese minerals are psilomelane and pyrolusite. In addition, a number of manganese minerals containing significant amounts of copper and zinc. Studies on the deportment of silver suggested that silver occurs as disseminated silver sulphide – acanthite / argentite as well as some minor unidentified silver sulphosalt species mostly in the manganese matrix. The copper mineralization occurs both in association with manganese (pyrochroite and lampadite) and independently, as very fine sulphides such as chalcocite in transitional mineralized material.

There have been several contrasting genetic models advanced for the Berenguela Ag-Cu-Mn deposit. Based on the latest information, the deposit model favoured by Aftermath is that Berenguela is a low sulphidation style base and silver bearing, lithology-controlled, carbonate replacement deposit (CRD).

1.5 Exploration

While no exploration has been carried out by the Issuer, exploration has been carried out over the years, though the majority of the activity has been drilling. Geological mapping at various scales has been carried out, but predominantly at deposit scale by Silver Standard.

A number of geophysical methods have been run consisting of gravity, magnetics, Induced Polarization (IP), and Magneto-Tellurics by Silver Standard and a detailed magnetic survey by Rio Tinto. Other than the IP, surveys were directed at the deposit.

Geochemical sampling has predominantly consisted of rock chips and soils, with a small number of stream sediments and grab samples being taken. The rock chip sampling has demonstrated two targets to the south and west of the deposit called Berenguela 2 and Berenguela West.

Silver Standard completed 11 shallow shafts or pits for both bulk sampling and grade validation as they twinned drillholes. This was on the 2004 drilling and comparisons were mixed and quite variable.

1.6 Drilling

No drilling has been performed by the Issuer to date. Aftermath has compiled and checked original data from the programs from 2004 to 2019 building a relational database in MS Access.

Since 2004 a total of 323 diamond drillholes (DD) and RC holes totalling approximately 36,473 m in length have been drilled on the Property consisting of 32 DD and 291 RC holes. Of this 53% of the metres was carried out by Silver Standard in the 2004 and 2005 campaigns. This was RC drilling and in the 2004 program issues were encountered with recovery and possible contamination. All of these holes were specifically drilled on the deposit and on a nominal 50 m x 50 m grid.

The Silver Standard drilling in 2010 was designed to test several geophysical and geochemical targets. Of the 17 holes, eleven of the holes were drilled outside of the deposit area, to the south and east. Six holes were drilled on the edge of the 2004 / 2005 drilling area exploring below the then known mineralization. All holes intersected mineralization although at lower overall grades than in the previous program. These holes were the first holes to test deeper levels at Berenguela, helping to define the stratigraphy below the known carbonate units. Core recovery was not recorded, but downhole surveys were completed, and core photographs taken.

Silver Standard's final program on the Property was in 2015 and consisted of 11 diamond core holes: five HQ size and six PQ size. The main purpose of the program was to obtain metallurgical samples and in part replicate or twin vertical RC holes from the 2004 / 2005 program. The twinning results are discussed in Section 1.7. Core recovery and RQD were recorded, angled holes were downhole surveyed and core photos taken.

Valor completed a total of 69 RC holes in 2017. This was an infill program on the deposit and to expand the known mineralization. The intended spacing of the program was nominally 35 m including the previous drilling. Most holes had downhole surveys and good quality digital photos of the RC chip trays are available for 59 of the 69 holes.

In 2019, Rio Tinto drilled four relatively deep exploration holes, investigating possible feeder zones and different styles of mineralization at depth below the known mineralization. The holes were surveyed using a multishot tool. Average core recovery for the 2019 program was 87.1%. RQD measurements were also collected. High quality digital photos of the core trays are available.

Silver Standard had resurveys of most early drillhole collars carried out but had to apply a correction to some which could not be relocated due to rehabilitation of drill pads. Since the beginning of the 2010 program collars have been surveyed using a differential GPS (DGPS) but the contractor is not always recorded. Aftermath has done some investigation on the data, but some resurveying is required.

Drilling was carried out with multiple holes from a single drill pad and the true thickness of mineralization is variable due to folding. However, above an NSR cut off of US$45 the potential economic true thicknesses as shown on cross section ranges from 16 – 75 m.

1.7 Sampling and data verification

RC drill samples were collected at the drill site by the drill crews and drillholes were sampled from collar to total depth. Sampling intervals in 2004 and 2005 were dependent on the drilling equipment selected with one metre intervals adopted in 2017. The process was according to common industry practice though there were drilling issues in 2004, requiring water flushing and with lost samples due to clogging of the bit in clay material.

Core samples were split on a nominal 1.5 m intervals with geology being respected such that sample ranged from 0.5 – 1.5 m.

Samples were dispatched to ALS Chemex, SGS Laboratories, or ALS Lima for the 2004, 2005, and 2010 programs, 2015 and 2017 programs, and 2019 programs, respectively. All the RC samples and pulps are stored in a warehouse in Chorrillos, near Lima, Peru, and the cores and pulps from DD campaigns are stored in Santa Lucía. All laboratories are accredited, and analytical methods were appropriate.

Quality control / quality assurance (QA/QC) practices were variable. QA/QC for the 2004 and 2005 programs suggest poor accuracy (poor CRM performance), poor precision (sub-optimal field duplicates), and potential contamination (numerous blank failures). This data is further compromised by drilling and sampling issues.

CRM performance in the 2010, 2015, and 2017 programs show acceptable analytical accuracy for Ag, Cu, and Zn. CRMs did not monitor Mn during these programs. CRMs used in the 2019 program show acceptable analytical precision in all elements.

Blank material used for all programs generally performed poorly, however show no material systematic contamination occurring during sample preparation and analysis.

With the exception of the 2017 program, field duplicates have not been submitted in sufficient quantities) to enable meaningful analysis. For small drill programs this may require a need for a higher insertion rate. Field duplicates included within the 2017 drill program show acceptable performance.

The QP recommends that further investigative work including some re-assaying with a full suite of QA/QC be completed prior to the use of data for Mineral Resource estimations.

The verification and validation carried out in the field confirm that all exploration campaigns were carried out as reported and reviewed the geology in the field. Due to no current exploration activity, the field inspection was focused on the observation of the project infrastructure, the cores and chips from drilling, outcrops, drill pads, and collars markers, as well as discussions on drilling techniques and exploration procedures. It also established that the samples and cores are secure and in good condition though the RC chips need cataloguing and sorting.

The brief data verification showed that drillhole collars do not fit the topography file provided, and there were a number of duplicate intervals found in the collar file. These are issues to be resolved. An assay verification exercise found no issues of consequence.

The QP is of the opinion at this time, that the exploration data requires considerable validation prior to being used for estimation purposes. As this data has only recently been acquired by the Issuer this is an ongoing process.

In 2015 Silver Standard drilled six twin core holes adjacent to vertical RC holes drilled in the 2004 - 2005 program, of which one was a redrill. Thus two 2015 diamond core drillholes (BED-003 and BED-003A) twinned one 2004 RC drillhole (BER-024). Four 2005 RC drillholes were each twinned by a single DD. This raised some questions as the one twinned 2004 RC drillhole showed a poor correlation with its twin. Review of sample weights from BED-024 indicate poor sample recovery associated with the mineralized interval. In addition, there is a poor correlation between the 2015 DD holes which cannot be explained and requires further review.

Twins of the 2005 RC drillholes show a considerably better correlation suggesting it may be a time limited issue but requires further work if the 2004 results are to be used in any estimation.

1.8 Metallurgical testwork

Investigations into extraction of copper and silver from Berenguela ore commenced in the early 1900’s. Ownership changed a number of times with various metallurgical processes tested that included:

- Direct smelting to produce Cu-Ag matte.
- Segregation roasting at pilot scale to produce Cu-Ag concentrate product.
- Segregation roasting followed by flotation to recover Cu and Ag concentrate.
- Reductive acid leach using sulphur dioxide or hydrogen peroxide combined with sulphuric acid to extract Cu and Mn with subsequent recovery of Ag using cyanide.
- Pre-concentration to reject carbonates and reduce acid consumption in the reductive leach process included fine grinding, heavy media separation, wet and dry high intensity magnetic separation and ore sorting.

KCA focussed on the hydrometallurgical reductive acid leach process to take advantage of recovering Mn in addition to Cu and Ag. This process also has an environmental benefit by avoiding the roasting stage. KCA demonstrated that a reductant was required to attack the Mn matrix and effectively liberate the encapsulated Cu and Ag.

High acid consumption and poor settling characteristics of the post leach residue focussed the recovery efforts on pre-concentration. Various methodologies were trialled to reject carbonates and silica with varying success. Valor showed that high intensity magnetic separation (HIMS) and ore sorting using TOMRA XRT (X-ray) were effective in rejecting carbonates and should be further investigated across the variability of the resource.

The complex mineralogy of the Berenguela deposit requires a deposit wide mineralogical classification of ore domains with consideration of the flowsheet, including pre-concentration. Extraction and recovery of minerals has been demonstrated. In future work, ore domain classifications need to be coupled with mineralogy, geometallurgy, and metallurgical performance to confidently enable prediction of extraction within the resource.

1.9 Conclusions and recommendations

Aftermath has only recently taken operatorship and is becoming familiar with the data and history. Drilling has consisted of both RC and DD with the majority of the drilling being RC. This method has had known issues with poor recovery in early campaigns. A small number of holes were twinned and results were mixed.

No significant risks and / or uncertainties have been identified that cannot be mitigated by a validation exercise and redrilling strategic holes or redrilling a portion of the deposit.

The following recommendations are made.

1.9.1 Geology and drilling

- Improve the geological understanding of the deposit and create consistent terminology for detailed mapping and logging of lithology, structural, alteration, and mineralization.
- Build a 3D lithology and structural model.
- Relog selected core and rock chips, incorporating consistent codes and description criteria compatible with the mapping.
- Rent more spacious premises in Lima so that samples can be sorted and inventoried.
- Procure new topography by flying a Lidar survey.
- Continue using large diameter (HQ or PQ) triple tube diamond core to maximise sample size and core recovery, minimizing the loss of clay material.
- Drill twinned diamond core holes of selected existing RC holes to test recovery and sample volume effects between the two drilling methods.
- Review the available 2015 bulk density data and determine a strategy for collection of density data in Aftermath's drilling programs, including a QA/QC regime. It is recommended that the full immersion wax method be used.
- Record and confirm the collar location of holes whose marker had been damaged. It is a viable task to find these as the locations are recognizable despite the reclamation. It would require some shallow excavation after locating a reference point based on the database coordinates.

1.9.2 QA/QC

- Procurement of appropriate CRMs and blanks material.
- Develop comprehensive QA/QC procedures incorporating appropriate insertion rates for CRM, blank, field duplicates, coarse duplicates, and pulp duplicates, with documented follow up.

1.9.3 Historical drilling

- Search the historical data for records of poor drilling conditions, poor recovery, contamination, wet samples, recovery information (weights) and plot against grades, and evaluate impact.
- Identify drillholes with problematic intervals and remove from future Mineral Resource databases.
- For drillholes with no apparent sampling issues, complete a campaign of additional twin drilling on remaining 2004 drillholes to assess whether that data is reliable. This will enable assessment of 2004 sampling protocols.

For all historical drilling with rejects and pulps available submit a subset of samples for analysis with QA/QC set of samples

1.9.4 Metallurgy

- Explore ore classification domains that are linked to the target flowsheet.
- Conduct ICP head assay suite and extensive mineralogy including QEMSCAN, XRD, SEM, microscopic examination of mineral and gangue.
- Develop a geometallurgical model to link the resource database variability to metallurgical performance variability.
- Develop ore characterization composites based on domain classification.
- Establish typical ore hardness parameters for major ore classes / types.
- Consider pre-concentration methods to establish feed stock characterization to downstream processing.

- Confirm characteristics of composites are in line with domain classification or adjust accordingly.
- Conduct dry HIMS on ore characterization composites.
- Validate rejection of carbonates, silica, and metal recovery to establish feed for downstream testing.
- Conduct sufficient variability test work to validate the geometallurgical model.
- Consider silica and carbonate rejection via ore sorting.
- Engage in a marketing study.
- Evaluate flowsheet options and conduct associated trade-off studies to determine the most effective processing route.

1.9.5 Drilling and program costs

In Table 1.1 there is a breakdown of the drilling costs. The program is set out with three elements: diamond drillholes for twinning or replacement purposes, resource development drilling and exploration drilling of adjacent targets.

Table 1.1 Drilling program and costs

Year	Holes	Length	Holes	m	Cost $
Replacement and twinned holes	**Already drilled**		**Proposed**		
2004	57	5,393	14	1,348	404,475
2005	165	13,766	25	2,065	619,470
2017	69	8,465	7	847	253,950
					1,277,895
Resource development drilling			25	3,000	900,000
Exploration drilling on new targets			6	720	216,000
Total drilling cost					2,393,895
Rounded					2,400,000

The next phase of metallurgical testwork, to compliment development of the resource should focus on process mineralogy, geometallurgy and include flowsheet development pre-concentration and prove up the optimum manganese recovery method. This sets the path forward to further develop the hydrometallurgical flowsheet and overall recovery in the subsequent testwork phase. It is estimated this initial phase of work will cost approximately C$0.8M. This does not include the cost of drilling to obtain sample.

Table 1.2 Cost summary

Item	Cost US$
Geological mapping and supervision	100,000
Reassaying pulps and QA/QC	150,000
IP survey	100,000
Lidar survey (Topography)	50,000
Drilling	2,400,000
Follow up metallurgical testing	800,000
Resource estimate and reporting	100,000
Total phase 1	**3,700,000**

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Abbreviations & acronyms

Abbreviations & Acronyms	Description
"	Inches
#	Number
$ or US$	US dollar
%	Percentage
°	Degree
°C	Degrees Celsius
µm	Micrometre
2D	Two-dimensional
3D	Three-dimensional
A	Amps
A/m^2	Amps per meter squared
AA	Atomic absorption
AAS	Atomic absorption spectroscopy
Aftermath or the Issuer	Aftermath Silver Ltd.
Ag	Silver
AgCuS	Stromeyerite
AgMn	Silver; manganese
Ai	Abrasion index
Al_2O_3	Aluminium oxide
ALS	ALS Cemex Peru
AMC	AMC Mining Consultants (Canada) Ltd.
ANA	National Water Authority
ASARCO	The American Smelting & Refining Co.
ASX	Australian Stock Exchange
Au	Gold
Ba	Barium
$BaSO_4$	Barite
BC	British Columbia
BED	Diamond drillholes (see DD)
Berenguela or the Property	Berenguela Property
BER	RC holes
BWI	Bond ball mill work index
C$	Canadian dollars
Ca	Calcium
$CaCO_3$	Calcite
$CaMg(CO_3)_2$	Dolomite
CaO	Calcium oxide
CDN	CDN Resource Laboratories Ltd
Charter	Charter Consolidated Limited
CIRA	Certificado de Inexistencia de Restos Arqueológicos
cm	Centimetre
cm^2	Square Centimeter
cm^3	cubic centimetre
CO	Carbon monoxide

Abbreviations & Acronyms	Description
COG	Cut-off grade
Concesión Minera	Mining concessions
CPS	Controlled Potential sulphidation
CRD	Carbonate replacement deposit
CRM	Certified reference material
CSA	Canadian Securities Administrators
Cu	Copper
CuEq	Copper equivalent
$CuFeS_2$	Sulphides chalcopyrite
Cu_5FeS_4	Bornite
Cu_2S	Chalcocite
DD	Diamond drillholes (see BED)
DGAAM	Directorate of Environmental Affairs of MINEM
DGPS	Differential GPS
DIA	Declaración de Impacto Ambiental or Environmental Impact Declaration
E	East
EIA	Environmental impact assessment
EIAd	Estudio de Impacto Ambiental Detallado
EIAsd	Estudio de Impacto Ambiental Semi-Detallado or Environmental Impact Study
EMD	Electrolytic manganese dioxide
EMM	Electrolytic Manganese Metal
ESE	East-south-east
EW	Electrowinning
FA	Fire assay
Fe	Iron
Fe_2O_3	Iron(III) oxide or ferric oxide
FreoMet	Fremantle Metallurgy
FTA	Ficha Técnica Ambiental or Environmental Technical Report
g	Gram
g/cm^3	Grams per cubic centimetre
g/L	Gram per litre
g/t	Grams per ton
General Mining Law	Uniform Code of the General Mining Law
GPS	Global positioning system
H_2O	Water
H_2O_2	Hydrogen peroxide
H_2SO_4	Sulphuric acid
ha	Hectare
HIMS	High intensity magnetic separation
HQ	Diamond Drill core size: hole = 96 mm, core = 63.5 mm
hr	Hours
ICP	Inductively Coupled Plasma
INGEMMET	The Institute of Geology, Mining and Metallurgy
IP	Induced Polarization
ISO	International Organization for Standardization
ITS	Informe Tecnico Sustentatorio

Abbreviations & Acronyms	Description
JORC Code	2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves
K_2O	Potassium oxide
$KAlSi_3O_8$	Microcline
KCA	Kappes, Cassiday & Associates
kg	Kilogram
kg/m^2	Kilogram per square metre
kg/t	Kilogram per short ton
km	Kilometre
kt	Thousand (short) tons
kWh	Kilowatt-hour
kWh/kg	Kilowatt-hour per kilogram
lab	Laboratory
Lampa Mining	Lampa Mining Company Limited
lb	Pound
LDL	Lower detection limit
LLD	Lower limit of analytical detection
LOI	Letter of intent
LSS	Liquid solid separation
M	Million
m	Metre
m^3	Cubic metre
Ma	Million years / mega annum
mA/cm^2	Milliampere Per Square Centimeter
MAi	Abrasion index
masl	Metre above sea level
mg/L	Milligram per litre
MgO	Magnesium oxide
Min	Minute
MINEM	The Ministry of Energy and Mines
mL	millilitre
mm	Millimetre
MMR	Modified Mining Royalty
Mn	Manganese
MnO	Manganese oxide
MnO_2	Manganese dioxide
$MnSO_4$	Manganese sulphate
Mt	Million tons
N	North
NaCl / HSl	Salt / Hydrochloric acid
NaCN	Sodium cyanide
NE	North-east
$(NH_4)_2S$	Ammonium sulphide
NH_4OH	Ammonium hydroxide
NI 43-101	National Instrument 43-101
NNE	North-north-east

Abbreviations & Acronyms	Description
NSR	Net Smelter Return
NW	North-west
ON	Ontario
OK	Ordinary Kriging
OREAS	Ore Research and Exploration P/L
oz	Troy ounce
oz/t	Troy ounces per ton
P_{80}	80% Passing
P_{100}	100% Passing
Pb	Lead
Petitorio Minero	Mining claim in application phase
PFS	Preliminary Feasibility Study
pH	pH is a measure of hydrogen ion concentration; a measure of the acidity or alkalinity of a solution
PMA	Plan de Monitoreo Arqueológico
ppm	Parts per million
PQ	Diamond Drill core size: hole = 122.6 mm, core = 85 mm
PRA	Process Research Associates
PRW	PRW Survey Company
QA/QC	Quality assurance and quality control
QP	Qualified Person as defined by NI 43-101
RC	Reverse circulation drilling
Report	Technical Report
Rio Tinto	Rio Tinto Mining and Exploration
ROM	Run-of-Mine
RPD	Relative paired difference
RQD	Rock quality designation
RWI	Bond rod mill work index
S	South
$S_2O_6^{2-}$	Dithionate ions
SD	Standard deviation
SE	South-east
SEDAR	System for Electronic Document Analysis and Retrieval
SENAMHI	The Peruvian National Meteorology and Hydrology Service
SiO_2	Quartz
SMB	Special mining burden
SMBS	Sodium metabisulfite
SMT	Special mining tax
SO_2	Sulfur dioxide
SOMINBESA	Sociedad Minera Berenguela S.A.
Sr	Strontium
$SrCO_3$	Strontianite carbonate
Silver Standard	Silver Standard Resources
SSRM	SSR Mining
SW	South-west
t	Short ton

Abbreviations & Acronyms	Description
t/m^3	Tonne per cubic metre
ton	Short (US) ton = 2,000 lb
tonne	Tonne = 1,000 kg
tpd	Tons per day
UIT	Tax unit
UKN	Upper detection limit
US	United States
UTM	Universal Transverse Mercator
Valor	Valor Resources Limited
W	West
WGS 84	WGS-84 datum
WHIMS	Wet high intensity magnetic separation
WNW	West-north-west
wt	Wet ton
XPS	XPS Consulting & Testwork Services
Zn	Zinc
ZnS	Zinc sulphide

2 Introduction

2.1 General and terms of reference

This Technical Report (Report) on the Berenguela Property (Property) has been prepared by AMC Mining Consultants (Canada) Ltd. (AMC) of Vancouver, Canada on behalf of Aftermath Silver Ltd. (Aftermath or the Issuer), of Vancouver, Canada. This report is an initial report for the issuer who has completed the initial closing of a transaction to SSR Mining (SSRM). Final closing of the Transaction is expected to take place on or before 24 November 2026.

There is a previous National Instrument 43-101 (NI 43-101) Technical Report on the Property titled "Technical Report on the Berenguela Property, South Central Peru", prepared for Silver Standard Resources Inc. authored by James A. McCrea, P.Geo., and with a signing date of 26 October 2005.

This report has been prepared by AMC in accordance with the requirements of NI 43-101 "Standards of Disclosure for Mineral Projects" and the Canadian Securities Administrators (CSA) for lodgement on CSA's System for Electronic Document Analysis and Retrieval (SEDAR).

2.2 The Issuer

The Issuer, Aftermath, is a Canadian junior exploration company focused on silver and is listed as AAG.V on Tier 2 of the TSX.V exchange, and as AAGFF on the OTCQB.

2.3 Qualification of authors

The names and details of persons who prepared, or who have assisted the Qualified Persons (QPs), in the preparation of this Technical Report are listed in Table 2.1. The QPs meet the requirements of independence as defined in NI 43-101.

Table 2.1 Persons who prepared or contributed to this Technical Report

Qualified Persons responsible for the preparation of this Technical Report						
Qualified Person	**Position**	**Employer**	**Independent of Aftermath**	**Date of last site visit**	**Professional designation**	**Sections of report**
Mr JM Shannon	General Manager / Principal Geologist	AMC Mining Consultants (Canada) Ltd.	Yes	No visit	P.Geo. (ON & BC)	2 - 6, 8 - 9, 11, 14 - 24, and parts of 1, 7, 10, 12, 25, 26, and 27
Mr MA Batelochi	Independent geological consultant	MB Geologia Ltda	Yes	8-12 Dec 2020	MAusIMM CP	Parts of 1, 7, 10, 12
Mr G. Lane	Chief Technical Officer	Ausenco	Yes	No visit	FAusIMM	13 and parts of 1, 25, 26, and 27
Other Experts who have assisted the Qualified Persons						
Expert	**Position**	**Employer**	**Independent of Aftermath**	**Visited site**	**Professional designation**	**Sections of report**
Mr P. Voulgaris	Technical Advisor	Aftermath	No	No	MAusIMM, MAIG	4 - 10 and 27
Ms K. Zunica	Senior Geologist	AMC Consultants (UK) Ltd.	Yes	No	None	11
Mr S. Robinson	Senior Geologist	AMC Mining Consultants (Canada) Ltd.	Yes	No	P.Geo. (BC)	10
Dr A. Ross	Geology Manager / Principal Geologist	AMC Mining Consultants (Canada) Ltd.	Yes	No	P.Geo. (BC)	Peer review

An inspection of the Property was undertaken by QP, Mr Marcelo Antonio Batelochi, of MB Geologia Ltda of Belo Horizonte / MG, Brazil on 8 – 12 December 2020, accompanied by Mr Juan Carlos Fernandez a consultant to Aftermath and Eng. Jaime Ortiz of SSRM. Note as all the previous work was carried out by Silver Standard Resources (Silver Standard), the former name of SSRM, Silver Standard will be used where applicable through the report. The scope of the visit covered the geology, data collection, and sampling aspects of the Property, including inspections of drill core and old drill sites; the core and sample storage is actually close to but outside the Property. In addition, the Chorrillos storage building in the metropolitan zone of Lima, where reverse circulation (RC) drilling chips, coarse, and pulp rejects are stored, was inspected.

2.4 Sources of information

Certain information in this report was compiled from previous reports as follows:

"Technical Report on the Berenguela Property, South Central Peru", prepared for Silver Standard Resources Inc., authored by James A. McCrea, P.Geo., and with a signing date of 26 October 2005. (2005 McCrea Technical Report).

"Technical Report and Updated Resource Estimate on the Berenguela Project, Department of Puno, Peru", which reported Mineral Resources compliant with JORC 2012. This report was for Valor Resources Limited (Valor), dated 8 February 2018 (2018 Valor JORC Report) and authored by Mr Marcelo Antonio Batelochi.

Parts of the text was supplied in draft form by Peter Voulgaris of Aftermath and validated and edited by the QPs. This information was supplemented by the report titled "Field Visit Report 8th – 12th Dec 2020 on the Berenguela Project, Department of Puno Peru", by Mr Marcelo Antonio Batelochi, December 2020 who is a QP as outlined in Table 2.1.

Any costs or currencies are shown in US dollars (US$ or $) unless stated otherwise.

2.5 Effective date

This report is effective as of 18 February 2021.

Aftermath was provided with a draft of this report to review for factual content and conformity with the brief.

3 Reliance on other experts

The QP has relied, in respect of legal aspects, upon the work of the Expert listed below. To the extent permitted under NI 43-101, the QP disclaims responsibility for the relevant section of the Technical Report.

The following disclosure is made in respect to this Expert:

- Dentons Gallo Barrios Pickmann SCRL, General Cordova No 313, Miraflores, Lima, 18, Peru.

Report, opinion, or statement relied upon:

- "Due Diligence of Sociedad Minera Berenguela S.A". dated 28 September 2020 in regard to the legal status of the mining concessions, surface rights and environmental issues.

Extent of reliance:

- Full reliance.

Portion of Technical Report to which disclaimer applies:

- Section 4.3, 4.4, and 4.5.

There are no other reports, opinions, or statements of legal or other experts on which the QP has relied.

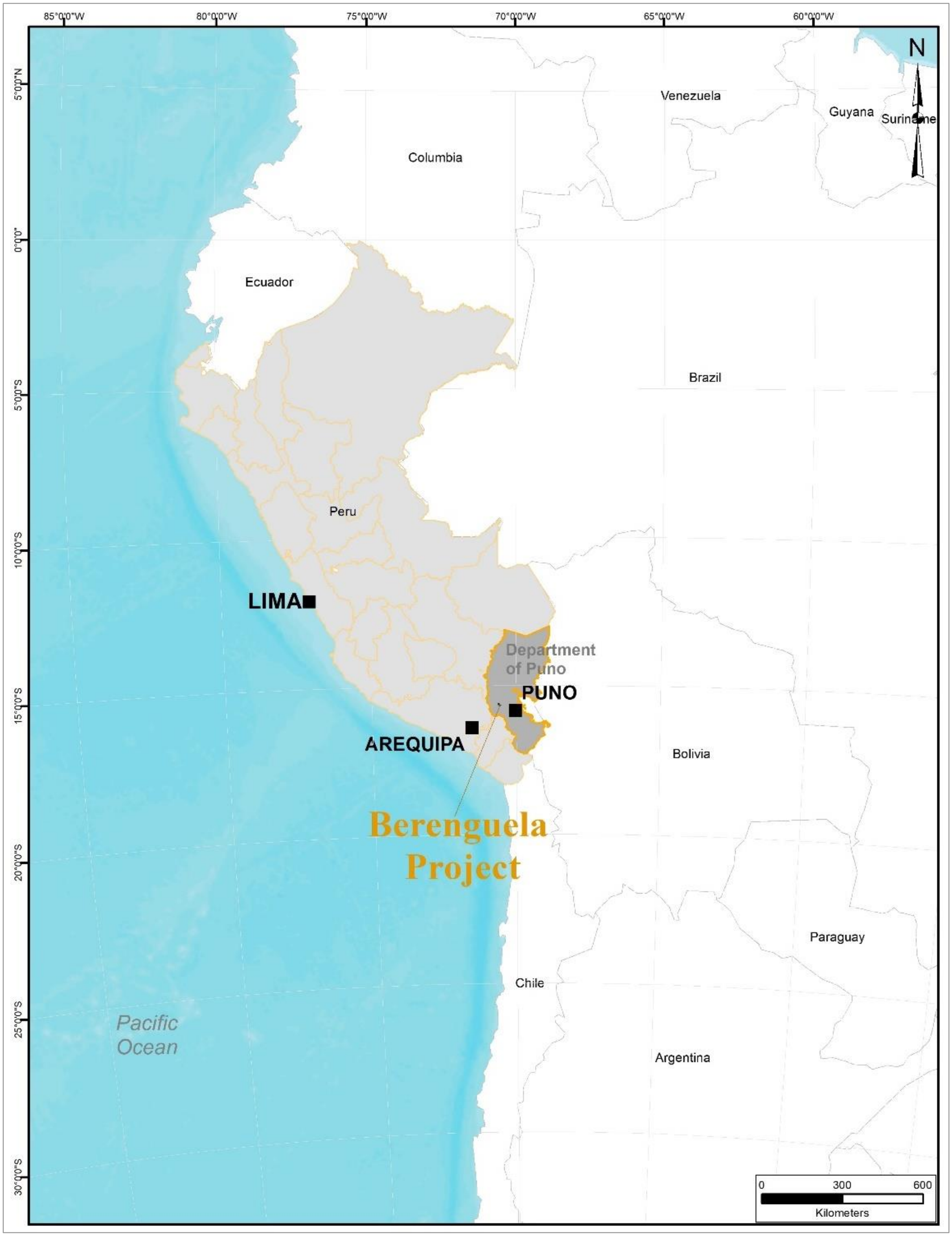
4 Property description and location

4.1 Property location

The Property within which the Berenguela project (Berenguela or the Project) is located, is in the province of Lampa in the Republic of Peru. The province of Lampa is located in the department of Puno. The approximate coordinates for the centre of the Property are 8,268,274 mN and 331,860 mE (WGS 84 zone 19), and at a latitude 15°39’30” S and longitude 70°34’06” W, as shown in Figure 4.1 and Figure 4.2.

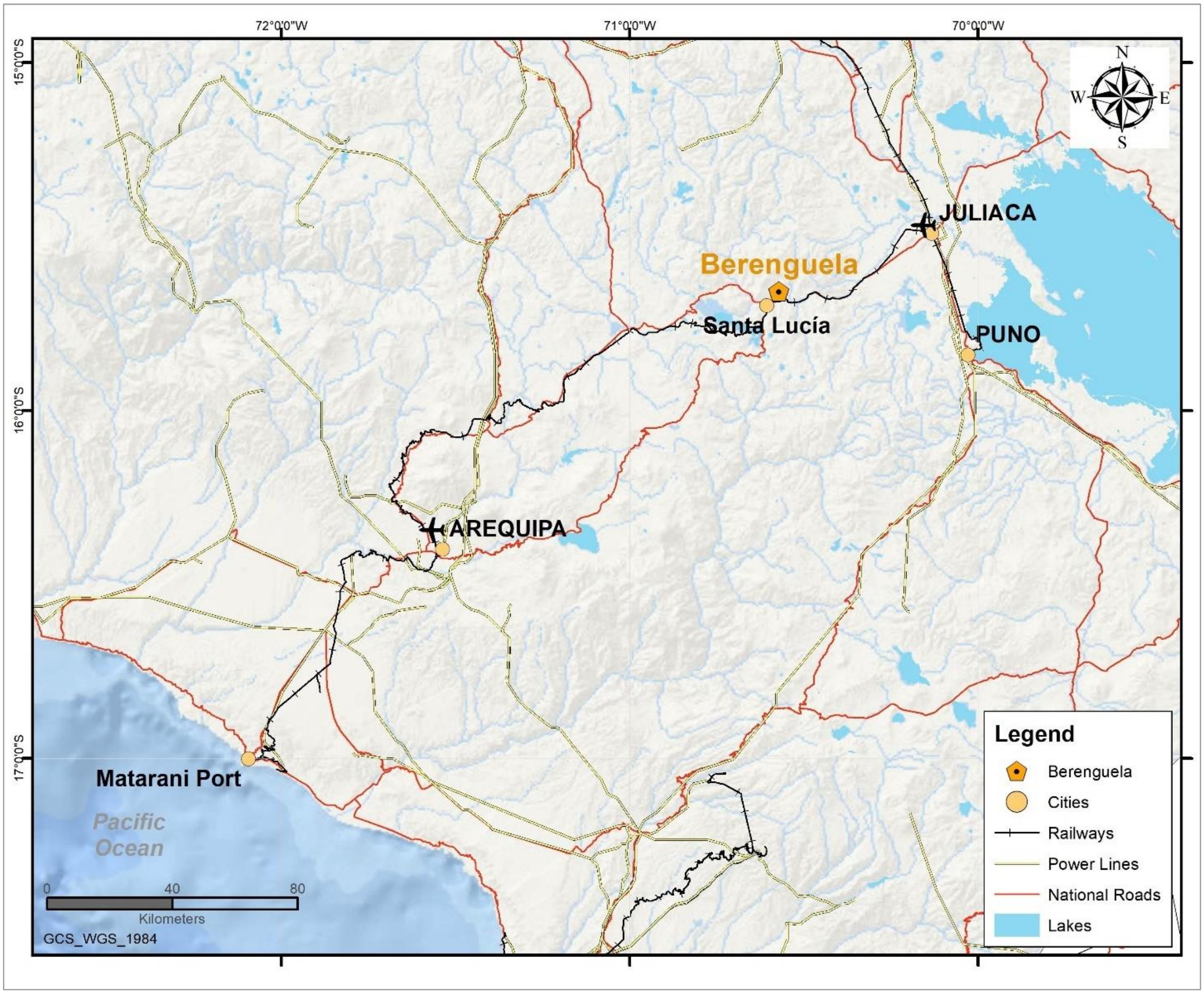
Berenguela is located six kilometres NE of the town of Santa Lucía, on the boundary between two communities, Cayachira to the east and Andamarca to the west.

Figure 4.1 Republic of Peru showing Property location



Source: Aftermath 2021.

Figure 4.2 Berenguela Property location map



Source: Aftermath 2021.

4.2 Peruvian regulatory framework overview

In Peru, the government retains ownership of all subsurface land and Mineral Resources. The ownership of extracted Mineral Resources, however, is vested on the titleholders of mining concessions. Under Peruvian law, there is a differentiation between the surface land property ownership and that of natural resources.

The right to explore, extract, process, and / or produce minerals in Peru is granted by the Peruvian government in the form of mining, processing, and transport concessions. The rights and obligations of holders of concessions are currently set forth in the Uniform Code of the General Mining Law ("General Mining Law"), which was approved by Supreme Decree N°. 14-92-EM, on 4 June 1992.

This law clearly defines the terms and conditions under which those mining activities are allowed in Peru. This includes the way in which mining rights can be obtained and maintained, how they can be lost and the obligations of their holders. The law also makes provision for contracts permitting options over mineral rights, assignments, and mortgages.

The rights granted by a mining concession can be transferred by their holders with no restrictions or requirements, other than to register the transaction with the Public Mining Register. The Mining Law defines the rules for the transfer of a mining concession and regulates other so-called mining contracts, such as option contracts, concession assignment agreements, mortgages, joint venture agreements, among others. The holder of a mining concession is entitled to the same protection available to holders of private property rights under the Peruvian constitution, the civil code, and other applicable laws. Concession can be owned by local or foreign individuals, or legal entities.

There are four different types of concession:

- Mining concession (allows exploration and mining activities). Concessions are termed mining claims (Petitorio Minero) when in the application phase, and mining concessions (Concesión Minera) after grant. No exploration or mining activities can be conducted on a mining claim. The same mining concession is valid for exploration and for exploitation operations; hence there is no procedure needed to convert title from exploration to mining.
- Production or beneficiation concession, allowing processing, refining, and concentrating activities.
- General labour concession, for ancillary services to mining concession titleholders.
- Mining transport concession.

The Ministry of Energy and Mines (MINEM) is the authority that regulates mining activities. MINEM is responsible for granting mining concessions through a specialized body called The Institute of Geology, Mining and Metallurgy (INGEMMET). The division of responsibilities between MINEM and INGEMMET is as follows:

MINEM:

- Granting of processing, general and transportation concessions.
- Many of the permits for large (>5,000 tpd) and medium (350 to 5,000 tpd) scale mining, including the authorization to start exploration and exploitation activities.

INGEMMET is responsible for:

- Processing and issuing of geologic information.
- Granting of mining concessions.
- The administration of the mining cadastre.
- The collection of license fees and penalty payments.

Mining concessions are granted on a "first come, first served" basis, with provision for an auction if simultaneous claims are made. Mining concessions can be granted separately for metallic and non-metallic minerals. Concessions are granted in areas that can go from 100 ha to 1,000 ha per concession, according to a defined Universal Transverse Mercator (UTM) co-ordinate system. There is no limit as to the number of concessions that can be held by a single mining company.

Under Peru's current legal and regulatory regime, mining concessions have an indefinite term provided that the concession owner:

- Pays the annual concession taxes or validity fees, called "Derecho de Vigencia", currently US$3/ha for large and medium scale metallic mines, payable on 30 June of each year. Failure to pay the Derecho de Vigencia for two consecutive years will result in the concession lapsing automatically.

Mining concessions oblige their holders to invest in the exploration and exploitation (production) of minerals. Therefore, mining holders are obliged to obtain an annual production per hectare (minimum production), no later than by the expiration of the tenth year, after which the production penalty payments described below commence, starting in the 11th year. The required production is calculated from the following year in which the title was granted of at least one Tax Unit (UIT). For 2020, this is approximately US$1,305.

In the event that the minimum production is not reached by the tenth year, a penalty is imposed per year and per hectare on a step scale, as defined by Legislative Decree N°1320 which became effective on 1 January 2019, of:

- As of the 11th year, 2% of the minimum production.
- As of the 15th year, 5% of the minimum production.
- As of the 20th year, 10% of the minimum production.

Failure to pay the penalty in any two years will result in the concession lapsing automatically.

Alternatively, no penalty is payable if a "Minimum Annual Investment" is made of at least 10 times the amount of the penalty.

Titleholders of mining concessions which were granted before December 2008 were obliged to pay the penalty from 2019 if the titleholder did not reach either the Minimum Annual Production or make the Minimum Annual Investment in 2018.

Mining concession must reach the minimum annual production target within 30 years after the concession was granted; failure to do so will cause the mining concession to lapse automatically.

In order to calculate the production and investment in each mining concession, the titleholder may create an operating unit, or "Unidad Económica Administrativa", provided the mining rights are all within a radius of five, ten or twenty kilometres, depending on the type of mineral produced.

4.3 Required and existing permits and authorizations

According to Peruvian regulations, to perform or undertake exploration activities, a titleholder must obtain all the permits, license, and authorizations required by law. The main permits and authorizations include surface rights, water rights, environmental, and archaeological considerations, as described in the following sections.

4.3.1 Surface rights

Concession holders must negotiate access agreements with surface landholders or establish easements. In the case of surface lands owned by communities, it is necessary to obtain approval of a qualified majority of the community.

At Berenguela there are 15 Rights of Use Agreements with surface landowners, covering 2,181.11 ha. The Rights of Use Agreements have a fixed five-year term. The current agreements were recently executed and expire on 31 December 2025. The annual cost of the 15 Rights of Use Agreements is discussed in Section 4.3.3. The agreement makes provision for a payment of S/502.50 (approximately US$140) per drill pad and associated construction to each land holder where the drill pads are located.

The current land access agreements cover the Berenguela deposit and surrounding area. However, they do not cover all of the concessions. If exploration is planned outside of the current land access agreements further agreement with those landowners will be needed.

Peru has adopted the Indigenous and Tribal Peoples Convention to protect the rights of indigenous and tribal people, as stated in article 2 of Law N°29785: "Indigenous or native people have the right to be consulted in advance on legislative or administrative measures that directly affect their collective rights, their physical existence, cultural identity, quality of life, or development”. This procedure is mandatory to develop investment projects in Perú. MINEM has, through an official Letter N° 343-2018-MEM-DGM/DGES dated 29 October 2018, indicated that the area covered in the Berenguela EIA-sd (see Section 4.3.3) is not located in a protected community.

4.3.2 Water rights

Water rights are governed by Law 29338, the Law on Water Resources, and are administered by the National Water Authority (NAW) which is part of the Ministry of Agriculture.

Water rights can be issued at three levels:

1. License: this is the right granted in order to use the water to a certain aim and in a determined place, and will be valid until the activity for which it was granted subsists (i.e., beneficiary concession).
2. Permission: this is the right granted in surplus water periods, by which the use of water is eventual and temporal.
3. Authorization: this is a right granted only for a period of two years – extended for an additional year – for the execution of studies, construction and land wash (i.e., mining projects). None of these are unlimited nor indefinite.

In order to maintain valid water rights, their beneficiary must fulfil certain duties, the main ones being:

- Payment of retribution, water tariff and any other economic obligation.
- Allocating the use of water according to the water right requested.

According to the hydrological law, the water rights cannot be transferred nor mortgaged. In the case of a change of title holder of a mining concession or the owner of the surface land who is also the beneficiary of a water right, the new title holder or owner can obtain the corresponding water right.

At Berenguela by means of Resolution N°211-2019-ANA-AAA. TIT dated 30 April 2019, Sociedad Minera Berenguela S.A., (SOMINBESA) is able to use water from the Rio Cabanillas up to a total volume of 25,920 m^3 through a Water Authorization issued by the Local Water Authority of Juliaca. This authorization is currently in force and will be valid until April 2021. SOMINBESA must implement a structure for the control and measurement of flows in the water source and report monthly the use of the water to the Local Water Authority of Juliaca.

This permit will likely need to be renewed prior to Aftermath’s first drilling program.

4.3.3 Environmental permits and considerations

The environmental regulations for mineral exploration activities were defined by Supreme Decree No. 020-2008-EM of 2008. New regulations for exploration were defined in 2017 by Supreme Decree No. 042-2017-EM. The Ministry of the Environment is the environmental authority, although the administrative authority is the Directorate of Environmental Affairs (DGAAM) of MINEM.

The environmental certification is classified based on the level of disturbance or the number of drilling platforms:

- An Environmental Technical Report (Ficha Técnica Ambiental or FTA) is a study for approval of exploration activities with no significant environmental impacts and less than 20 drill platforms.
- Category I: Environmental Impact Declaration (Declaración de Impacto Ambiental or DIA) must be prepared for exploration activities, defined as a maximum of 40 drill platforms or surface disturbance of up to 10 ha.
- Category II: Environmental Impact Study (Estudio de Impacto Ambiental Semi-Detallado or EIAsd) is required for exploration programs, between 40-700 drilling platforms or a surface disturbance of 10 ha. The last programs at Berenguela operated under this level of assessment.
- Category III: a full detailed Environmental Impact Study (Estudio de Impacto Ambiental Detallado or EIAd) must be presented for projects that could generate highly negative environmental impacts. The preparation and authorization of such a study can take as long as two years.

All previous drilling programs at Berenguela have been conducted under the previous environmental assessment system (2004 and 2005 programs) or under approved EIAsd since and their variations since 2010.

The following environmental permits for drilling are currently in force at Berenguela:

- Environmental Impact Study Semi-detailed EIAsd, approved through Resolution N°181-2018-MEM-DGAAM dated 3 October 2018 for 37 drill platforms and 142 drillholes, sumps and new access tracks.
- Modification of the 2018 Berenguela EIAsd, Primer Informe Tecnico Sustentatorio (ITS), approved through Resolution N°069-2019-MEM-DGAAM dated 15 May 2019. This amendment included an additional seven drill platforms and new access tracks, with a six month extension.

The EIAsd and the ITS modification will expire 15 April 2021. Drilling outside of the scope of these permitted activities will need to be via a new EIAsd.

4.3.4 Existing environmental liabilities

In accordance with Peruvian Law 28271, generators of environmental liabilities are responsible for remediation activities. Therefore, if historical environmental liabilities are defined, responsibility for these lies with the original generator; the current concession owner is not responsible for either the consequences of such liabilities or the activities of remediation.

MINEM has 27 historical environmental liabilities listed on the Inventory of Mining Environmental Liabilities over the Berenguela Mining Concessions. These include historical surface pits / mines, mine dumps, cleared areas, and the historic Tulva processing plant site.

In addition, according to the environmental base line contained in the Berenguela EIA SOMINBESA reported to the environmental authority the presence of 184 additional environmental liabilities, again the result of historical mining activities.

Due to the historic nature of these mining liabilities remediation had been assumed by the Peruvian Government through to Activos Mineros S.A.C., a state-owned company responsible for the remediation of mining environmental liabilities on behalf of the State.

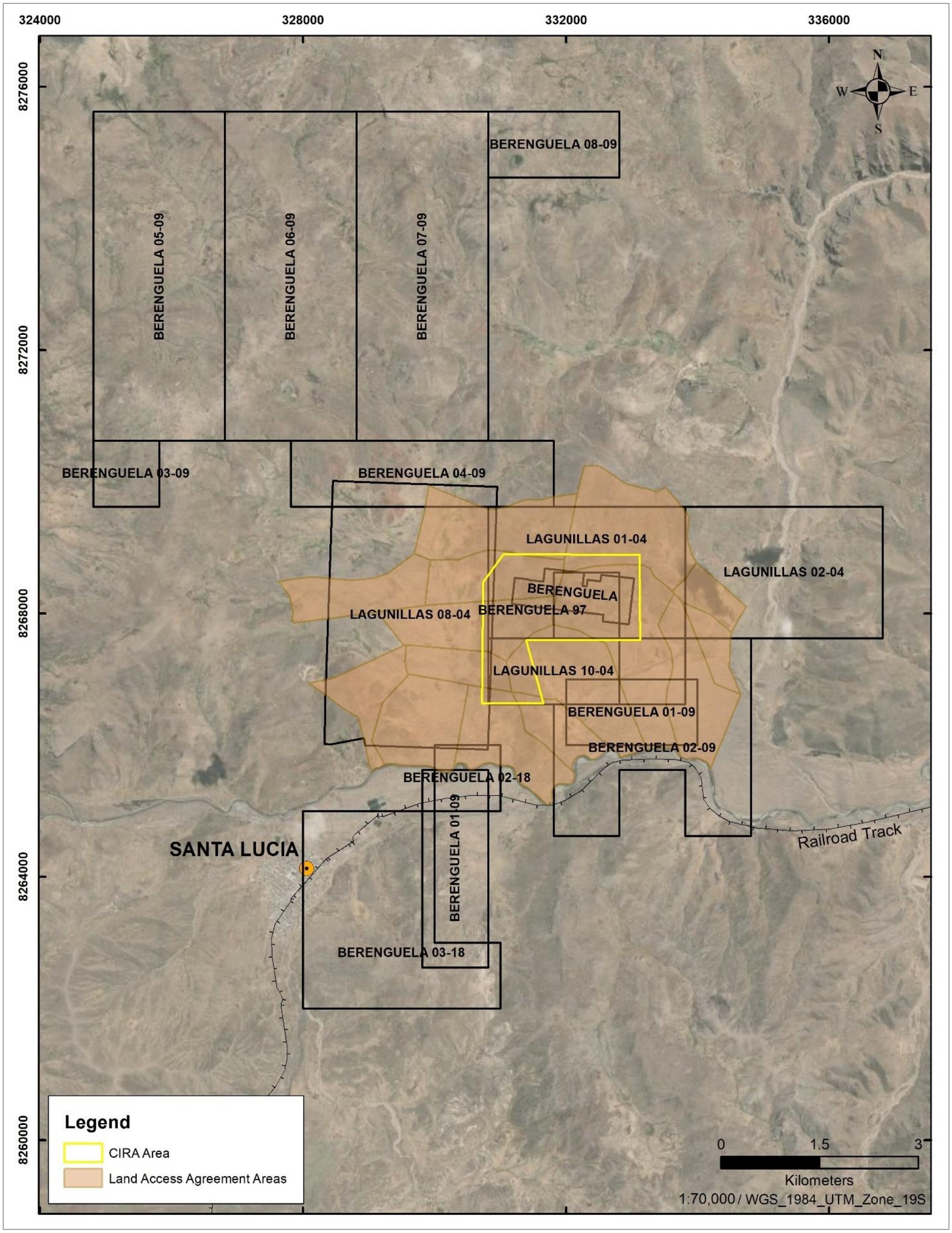
4.3.5 Archaeological considerations

A certificate of non-existence of archaeological remains (“Certificado de Inexistencia de Restos Arqueológicos” or CIRA) issued by the Ministry of Culture certifies that no archaeology will be disturbed. Any earth movement still requires direct supervision of an onsite archaeologist as described in an Archaeological Monitoring Plan (“Plan de Monitoreo Arqueológico” or PMA) which describes the effective manner to respond to an archaeological find.

The certificate of non-existence of archaeological remains (CIRA) for the Berenguela Project was approved in CIRA N°110-2015 dated 11 June 2015 over an area of 380.14 ha, as shown in Figure 4.3 which also shows surface landowner boundaries with land access agreements over the mining concessions.

Previous drill platform construction has been conducted with PMA approval. Future programs will require new PMAs.

Figure 4.3 CIRA area with landowner boundaries and access agreements



Source: Aftermath 2021.

4.4 Taxes and encumbrances

Peruvian corporations are subject to corporate income taxes at a rate of 29.5%. Mining companies are subject to specific mining taxes and royalties; the Modified Mining Royalty, Special Mining Tax and Special Mining Burden, the following summary is drawn from information from EY (2019).

4.4.1 Modified Mining Royalty (MMR)

MMR applies on companies' operating income, rather than sales. The MMR is payable on a quarterly basis with marginal rates ranging from 1% to 12%. An "operating income" to "mining operating revenue" measure (operating profit margin) is calculated each quarter and depending on operating margin the royalty rate increases as the operating margin increases.

Companies must always pay at least the minimum royalty rate of 1% of sales, regardless of its profitability. The amount actually paid for mining royalties shall be considered as an expense for purposes of calculating the Income Tax.

4.4.2 Special Mining Tax (SMT)

The SMT is a tax applied to mining income. The marginal rate, depending on the margins, ranges from 2 - 8.4% levied on their quarterly net operating profits from the sale of metallic Mineral Resources. The amount actually paid for SMT shall be considered as an expense for purposes of calculating the Income Tax in the fiscal year in which it was paid.

4.4.3 Special Mining Burden (SMB)

Large mining companies, with tax stability agreements in place prior to 1 October 2011 a 4% to 13.12% tax is imposed on operating income.

4.4.4 Employee participation

Employees are entitled to participate in the profits of all the mining companies developing income-generating activities. As a result, mining companies are obliged to distribute 8% of their annual taxable income before taxes on behalf of all their employees, with a maximum limit equivalent to 18 monthly salaries per employee.

A mandatory contribution paid to the Peruvian Mining Retirement Fund based on pre-tax profits, after deduction for the royalty tax and SMT is assessed at a rate of 0.5%.

4.5 Berenguela Property land tenure and ownership

4.5.1 Ownership

On 27 July 2020, Aftermath entered into a binding Letter of Intent (the "LOI") with SSRM to purchase 100% of the Berenguela silver-copper project through the purchase of 100% of SSRM's shares in the Peruvian holding company SOMINBESA. The definitive agreement was signed on 30 September 2020 and amended on 23 November 2020.

The amended terms of the acquisition include certain staged payments, the completion of a Preliminary Feasibility Study (PFS) and filing on SEDAR of a NI 43-101 Technical Report summarizing the PFS, and the granting of a sliding scale net smelter return (NSR) royalty to SSRM, as discussed in Section 4.5.4.

The progress against the acquisition payments and work commitments are summarized in Table 4.1.

Table 4.1 Aftermath Berenguela acquisition payment terms and progress

Date	Payments and work commitments (US$, unless noted)	Status
27 Jul 2020	$1,000,000 cash	Paid
23 Nov 2020	$725,000 cash C$3,358,902.50 in Aftermath Shares	Paid Paid
23 Nov 2021	$2,250,000 cash	
23 Nov 2022	$2,500,000 cash	
23 Nov 2024	$3,000,000 cash Filing of a PFS	
23 Nov 2026	$3,250,000 cash	

4.5.2 Land tenure

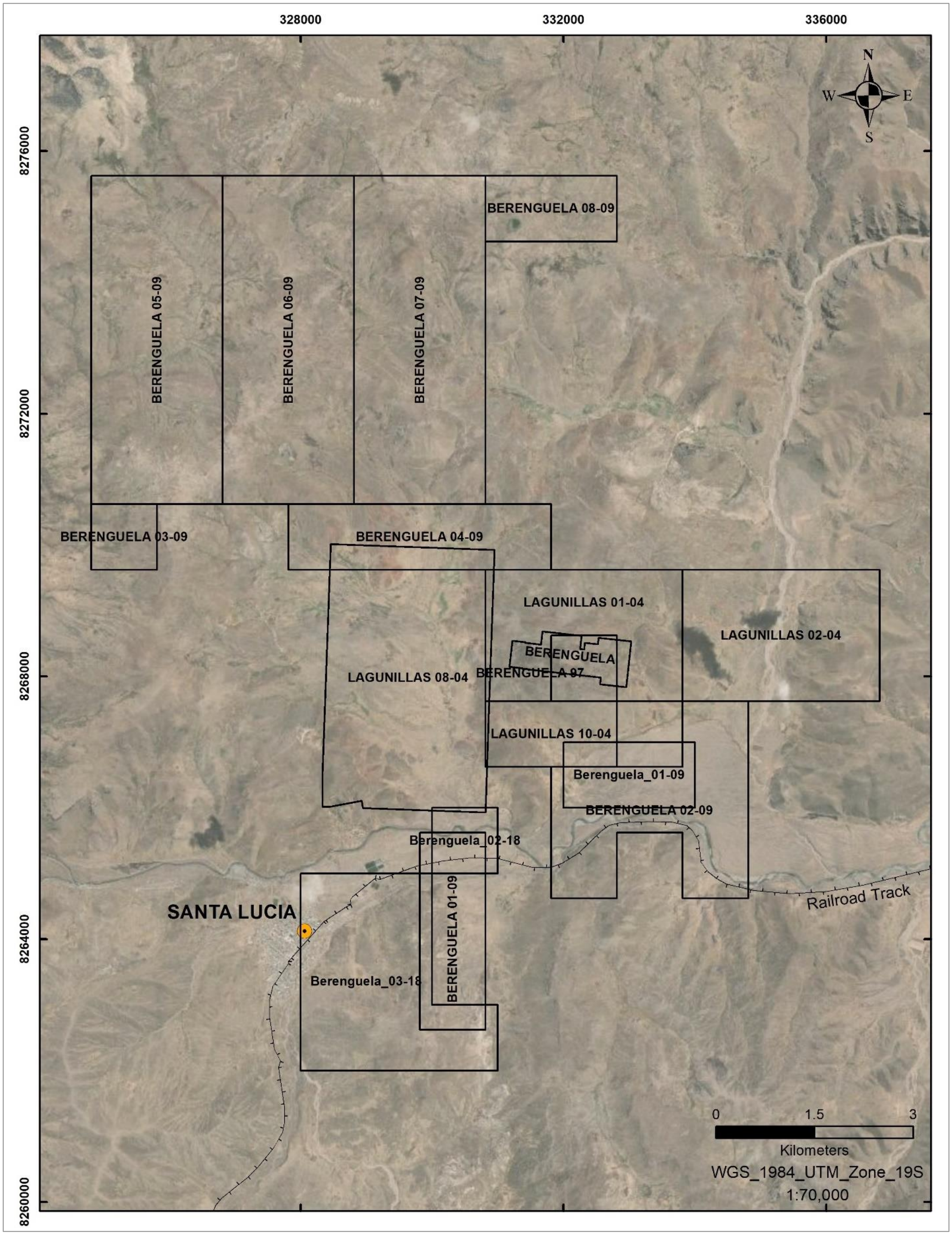
There is a total of 17 mining concessions held by SOMINBESA, as recorded on the INGEMMET Mining Public Registry which have an area of 7,357 ha. These are listed in Table 4.2, and shown in the map in Figure 4.4.

Table 4.2 List of mining concessions

Name	National code number	Grant date	Area (ha)
BERENGUELA	13000001Y03	30 July 1992	100.0005
BERENGUELA 97	010128997	27 March 1998	41.3308
BERENGUELA 01-09	010111609	10 February 2010	300.0000
BERENGUELA 02-09*	010111509	13 September 2010	526.0620
BERENGUELA 03-09**	010134109	20 January 2010	36.3580
BERENGUELA 04-09	010134209	30 December 2009	313.0870
BERENGUELA 05-09	010134409	16 September 2009	1,000.0000
BERENGUELA 06-09	010134509	26 October 2009	1,000.0000
BERENGUELA 07-09	010134009	30 November 2009	1,000.0000
BERENGUELA 08-09	010134309	30 November 2009	200.0000
LAGUNILLAS 01-04	010135004	19 November 2004	440.0680
LAGUNILLAS 02-04	010135104	4 August 2004	600.0000
LAGUNILLAS 08-04	010151204	26 August 2004	995.6453
LAGUNILLAS 10-04*	010271004	19 November 2004	41.9927
BERENGUELA 01-18	010081918	7 March 2019	36.5112
BERENGUELA 02-18	010090418	7 March 2019	26.2603
BERENGUELA 03-18	010094618	Pending	700.0000
		Total	**7,357.3158**

Notes:
* Overlap a pre-existing and current concession known as Santa Lucía 14.
** Overlap a pre-existing and current concession known as Lucia Josefina 1.

Figure 4.4 Plan of Berenguela mining concessions



Source: Aftermath February 2021.

4.5.3 Land holding costs

The annual concession taxes or validity fees paid in 2020 were US$24,890.

The production "penalty" payments as applied to concessions over 10 years old in 2020 total S/ 479,909.58, approximately US$133,600.

The annual cost of the 15 Rights of Use Agreements (see Section 4.4.2) for 2020 is S/ 50,265.76, approximately US$13,930.

SOMINBESA also pays nominal rent for the Limon Verde core farm and the Lima sample storage warehouse.

Based on information provided on 28 September 2020, by Aftermath's Peruvian counsel, Dentons Gallo Barrios Pickmann SCRL, all fees for the mining concessions are fully paid and in good standing.

4.5.4 Royalties

As part of the Aftermath acquisition agreement, SSRM retains a sliding-scale NSR royalty on all mineral production from the Berenguela project for the life of mine, commencing from the declaration of commercial production. This royalty agreement will in effect replace a 1% NSR that originated from the transaction between SSRM and Valor. The sliding scale is based on the following:

- 1% NSR, on all mineral production when the silver market price is up to and including US$25 per ounce.
- 1.25% NSR on all mineral production when the silver market price is over US$25 per ounce and when the copper market price is above US$2 per pound.

Originating from the 2006 sale by Kappes, Cassiday & Associates (KCA) (VDM Partners) to Silver Standard, a 2% NSR Royalty capped at $3 million was applicable on all copper produced from the Berenguela Concessions.

Set out in the Public Deed of the Transfer Agreement dated 6 November 2006 is a 2.5% Net Smelter Returns Royalty on any minerals extracted and processed from each of the Lagunillas 01-04, Lagunillas 02-04, Lagunillas 08-04 and Lagunillas 10-04 mining concessions for the benefit of Minera Silex del Peru S.R.L.

Royalties to the State are described in Section 4.4.1.

5 Accessibility, climate, local resources, infrastructure, and physiography

5.1 Accessibility

Access to the Property can be made all year round from Juliaca driving SW on highway 34A for about 65 km via Santa Lucía. This trip takes between 45 min to 1 hour. Alternatively, the Property can be reached from Arequipa on highway 34A for about 120 km to Santa Lucía, a trip of about 3 hours.

Daily commercial airline services are available between Juliaca and Lima, approximately 45 to 60 minutes. Figure 4.2 shows the relationship of these locations to the Property.

From Santa Lucía a dirt road heads north across the Rio Cabanilla, past the Límon Verde camp and then leaving the Rio Cabanilla valley turning north up the Andamarca valley. After traveling about 2 km up the valley a turn-off to the east is taken that heads towards the Hacienda Andamarca. This dirt road crosses the valley and is followed for about 4 km, cross the Rio Andamarca, up the hill to the western side of the Berenguela deposit, as shown in Figure 5.1.

5.2 Topography and physiography

The Property lies between 4,150 and 4,280 m above sea level (masl) in the Western Cordillera of southern Peru in a geographical terrain known as the altiplano (high plateau). The main topographical and cultural features are shown in Figure 5.1, and a general view of project area is shown in Figure 5.2. Relief is moderate with relatively poorly drained pampas and limited vegetation.

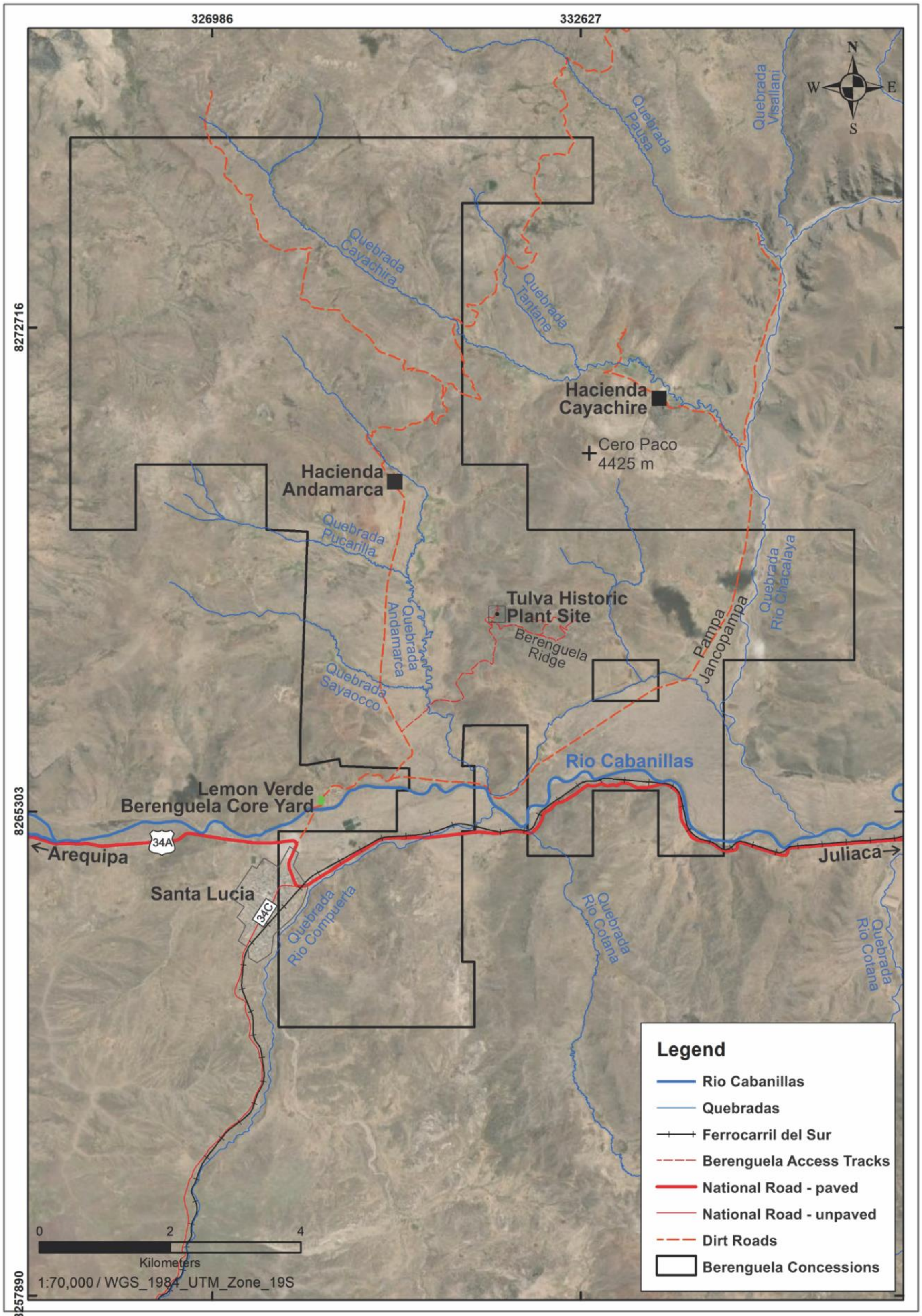
The Berenguela deposit area lies on a ridge between two drainages, Quebrada Andamarca and Rio Chacacaya. Both drain to the south and into the Rio Cabanillas. The Rio Cabanillas has a wide flat alluvial plain which extends up the Rio Chacacaya valley to the NE; an area called the Pampa Jacopampa. There is one other unnamed quebrada, (drainage) that drains the hills to the east of the deposit area and meets the Rio Cabanillas to the SE of the deposit. The Rio Cabanillas has its origins approximately 4.0 km west of Santa Lucía where the Rio Verde and Rio Cerrillos meet. The Rio Cabanillas itself travels 66 km to the east, until it joins the Lampa River, along with other rivers in the area feeding into Lake Titicaca.

The slopes of the hills are typically covered with sparse Ichu grasses and scrub. The steeper slopes generally have much less vegetation and are mostly covered by talus and rock debris.

The surface areas inside and outside the project are owned by traditional Peruvian people who are organized into associations to promote the local economic activity represented by the breeding of camelids (vicuñas, alpacas). The camelids feed on natural pastures and "puna" straw through extensive grazing, supplemented with harvest residues (chala), and fresh herbs.

The highest point in the project area is to the north of the Berenguela deposit, Cero Paco at 4,425 masl.

Figure 5.1 Map of the Property



Source: Aftermath 2021.

Figure 5.2 General view of Berenguela Project area from the Burton block, looking NE

Source: Juan Carlos Fernandes, December 2020.

5.3 Climate

The Peruvian National Meteorology and Hydrology Service (SENAMHI) maintains a network of weather and hydrograph stations throughout Peru. The closest weather stations to Berenguela are at Santa Lucía, at an elevation 4,045 masl, 6 km to the south-west of the Project, Cabanillas, 23 km to the east, at an elevation 3,885 masl and at Pampahuta, at an elevation 4,316 masl, located 23 km to the north-west of the Property. Average monthly minimum temperatures however vary significantly with altitude, hence Santa Lucía and Pampahuta stations are considered more representative of the climatic conditions at the Property.

The data for the stations can be accessed via the SENAMHI web page (www.senamhi.gob.pe). Data for Santa Lucía is only available from March 2009 and September 2013, and between October 2019 and March 2020. The Pamapahuta weather station has a longer record available with data available from December 1961 until October 2013, and again between May 2017 and November 2020.

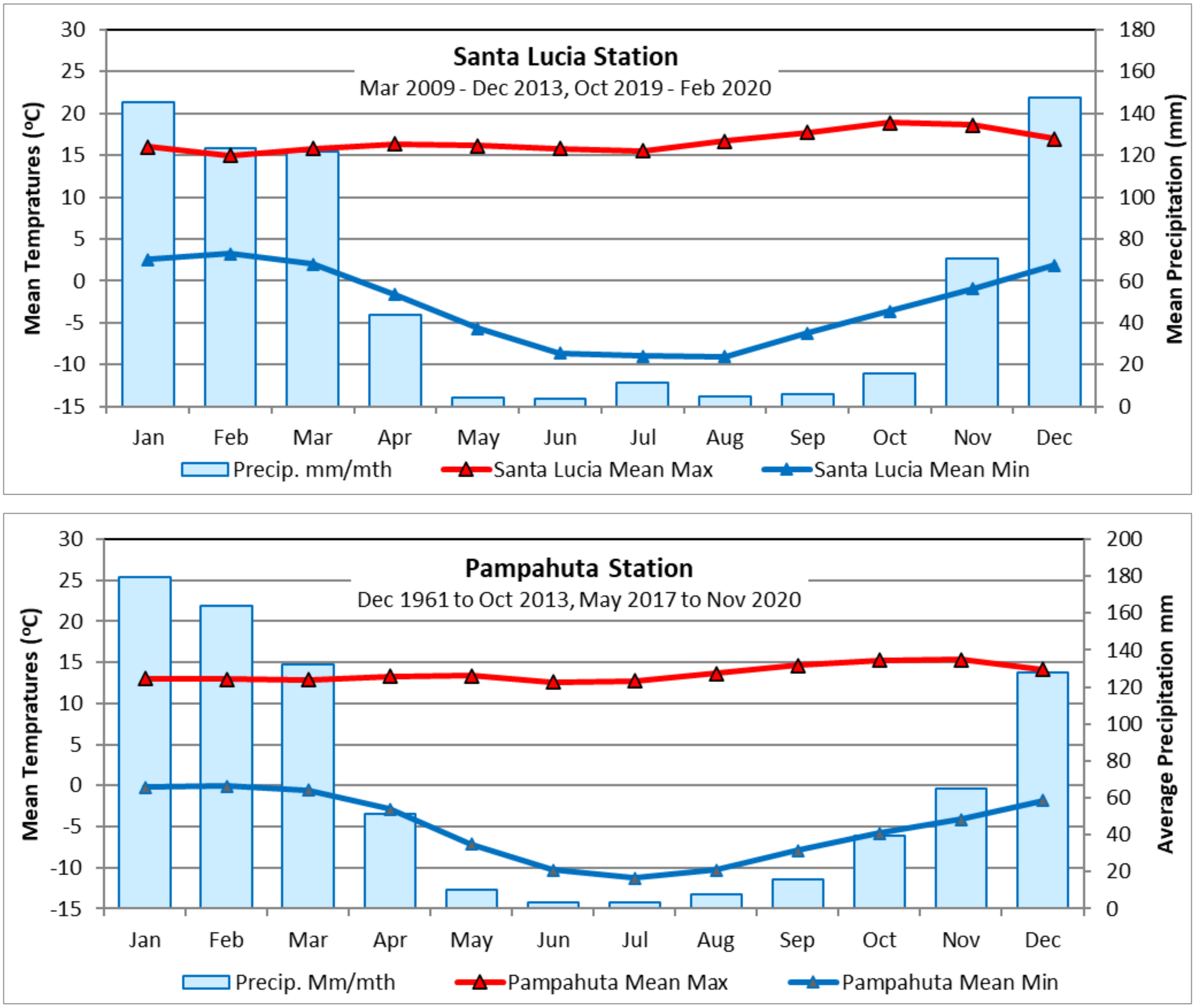
The temperature and precipitation data for the two weather stations is summarized in Figure 5.3. Berenguela is located in a climate described as “tundra climate” in Köppen climate classification system.

Average monthly maximum temperatures peak in October and November, at Santa Lucía and the average maximum is 18.9°C. At Pampahuta they average 15.3°C. The lowest average monthly temperature is -9.0°C and -11.2°C at Santa Lucía and Pampahuta respectively.

Precipitation occurs predominately between December to March, where average monthly precipitation varies between 122 and 147.4 mm at Santa Lucía with an average of 16 days with greater than 3 mm. At the Pamapahuta station the average monthly precipitation varies between 127.7 and 179.7 mm, with an average of 12 days with greater than 3 mm.

Exploration can be performed year-round. Any future mining activities would also be conducted year-round.

Figure 5.3 Mean minimum and maximum monthly temperatures



Source: www.senamhi.gob.pe.

Figure 5.4 General view of the Limon Verde core logging and processing compound

Source: Juan Carlos Fernandes, December 2020.

5.4 Local resources and infrastructure

The Santa Lucía district has a population of about 7,500 of which about 5,300 live in Santa Lucía. Santa Lucía has national grid power, hospital, police station, elementary and high schools, technical institute, and a freight train station. Arequipa (population 1 million) and Juliaca (population 276,000) are well serviced with professional services and manual labour supporting the mining industry.

The Berenguela core farm and storage area is located in an area 1 km north of Santa Lucía and 5 km from the Project. It is located in an old mining camp area called Limon Verde. The core storage area includes two warehouses used as core shacks, office, logging area, and storage of the diamond core trays, see Figure 5.4.

The standard gauge rail line, the Ferrocarril del Sur, starts at the city of Puno, passes through Juliaca, Santa Lucía and Arequipa on its way to the Matarani Port on the Pacific coast. PeruRail own and operate the freight line. Amongst other commodities, the rail line is used to transport copper concentrate from the Cerro Verde copper mine, 32 km south-west of Arequipa. Matarani Port is one of three major ports in Peru, with warehousing and loading facilities for bulk commodities, mineral concentrates, and containers.

The Property is sufficiently large enough, at over 7,595.2 ha, to locate a processing plant, tails management facility, and other infrastructure required to operate a mine.

6 History

6.1 Ownership

Berenguela has a long history of exploration and production dating back to Colonial times. This summary of the mining history of Berenguela is not considered to be all-inclusive since not all exploration and development activities have been documented.

A summary of ownership and options is shown in Table 6.1 and is elaborated on in Section 6.2 which discusses the exploration and development work carried out over time.

Table 6.1 Ownership summary

Years	Company	Milestone
1903	Grundy	Grundy family carried out selective mining in area
1906	Lampa Mining Company Limited	Acquired Berenguela from Grundy
1965	Lampa Mining Company Limited	Ceased operations
1965-66	ASARCO	Executed a purchase option, which was terminated in September 1966
1966-68	Cerro de Pasco Corporation	Took an option to purchase which was terminated in November 1968
1968-70	Charter Consolidated	Option to purchase
1970	Lampa Mining Company Limited	Lost ownership of the Property, and it reverted to the state
1972	Minero Peru	Ownership passed to Minero Peru, a state-owned company
1995	Kappes, Cassiday & Associates	Purchased through competitive bid and SOMINBESA formed
2004	Silver Standard	Option Agreement with SOMINBESA
2006	Silver Standard	Met option criteria and KCA transferred its shares of SOMINBESA
2017	Valor	Signed an agreement to purchase SOMINBESA
2017-18	Valor	Carried out drilling programs, then sought JV partner
2019	Rio Tinto	Carried out exploration as part of JV option
2020	Valor	Unable to meet cash payments so property reverted to Silver Standard
2020	Aftermath	Agreement to purchase

6.2 Exploration and development

The following is a summary of the known exploration and development history of Berenguela, as carried out by various owners and optionees. The list may not to be all-inclusive since not all exploration and development activities have been documented, and additional historic documents may yet be located.

Selective mining was carried out at Berenguela since 1903. While no documents are available, the Property appears to have been owned privately by the Grundy family, who had other significant land holdings in the region. Lampa Mining Company Limited (Lampa Mining) owned the Property from 1906 to 1965. Lampa Mining's activities are detailed below.

6.2.1 Lampa Mining activities

In 1906 Lampa Mining of Liverpool, England was floated to develop six mines in the Lampa district, around Santa Lucía. Berenguela was acquired, from the Grundy family, along with other properties in the region in 1913 for equity in Lampa Mining, Lampa Mining Company (circa 1957). Selected pockets of high-grade silver ores were direct shipped until being exhausted during World War II, see Lampa Mining Company (circa 1957).

The operations struggled from 1930 through 1934, at which time a plant was built at Berenguela to precipitate silver and copper and produce manganese sulphate. When sulphur prices increased, which was required for the process, and with uncertain market conditions for manganese sulphate the process was abandoned.

Production records from Lampa Mining are not available prior to 1935. During the period 1935 to July 1941 Lampa Mining processed a total of 27,349 t at 164.9 oz/t silver and 2.4% copper (McCutchan 1941).

An oil fired reverberatory furnace was built at Berenguela around 1941 - 42 to process material below direct shipping grades. This was at a site located on the western side of the deposit, at a location called Tulva, shown in Figure 6.1. The plant proved effective and a larger scale reverberatory furnace was commissioned about 1946. Once constructed, the earlier furnaces were demolished and a second reverberatory furnace was built in its place. Pyrite and silica flux were obtained from Lampa Mining's other operations in the region. In March 1956, a third reverberatory furnace was commissioned, Lampa Mining Company (circa 1957).

Figure 6.1 Lampa Mining's Tulva processing site, looking NE

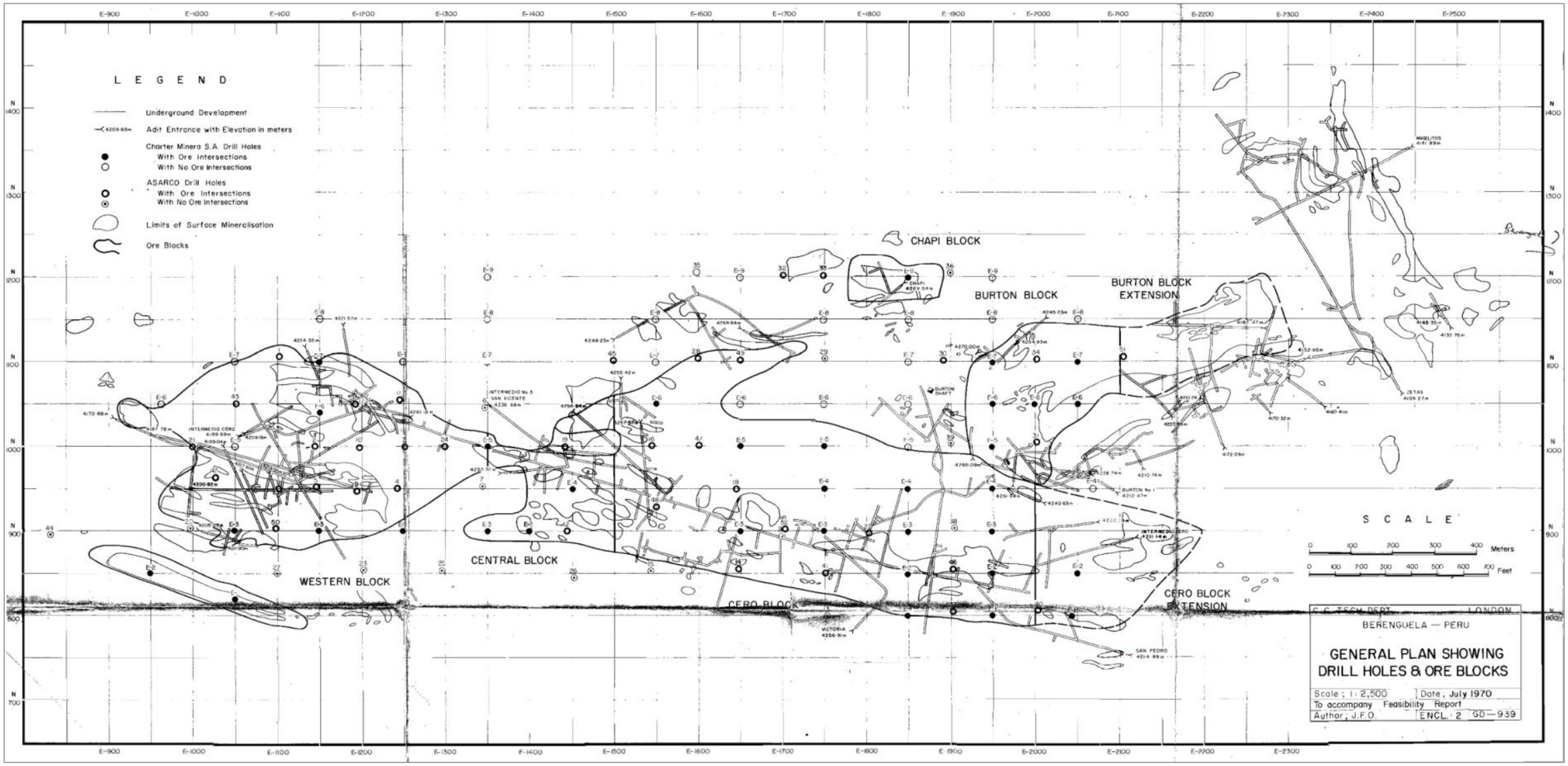
Source: Juan Carlos Fernandez Dec. 2020.

In the 1954 Lampa Mining investigated segregation roasting, which included the operation of a pilot plant, built in England, which was shipped and erected adjacent to the reverberatory smelter furnaces. The testwork and process were described by Pollandt and Pease (1960).

Production between June 1944 and July 1956 was 189,126 tons at 2.09% Cu and 17.15 oz/t Ag. (Lampa Mining Company, circa 1957). In 1965, Lampa Mining ceased operations at Berenguela after mining a total of approximately 500,000 t from approximately 17,700 m of underground workings (Figure 6.2) and small open pits, producing 3.24 million ounces of silver and 3,946 t of copper.

A plan of the underground workings as of 1970 is included as Figure 6.2.

Figure 6.2 1970 Plan of Lampa Mining's underground workings



Source: Kalcov and Waddle 1970.

6.2.2 Lampa Mining optionees

The American Smelting & Refining Co. (ASARCO) executed a purchase option on Berenguela in August 1965. ASARCO undertook the first studies on Berenguela for which documents are available. Work included topographical surveys, drilling 52 holes on a 50 m grid for 3,241 m, and obtaining a 300 t bulk sample from the underground workings. The option was terminated in September 1966 (Salazar 1967).

The American owned Cerro de Pasco Corporation, operators of the La Oroya copper smelter east of Lima, took out a purchase option on Berenguela from Lampa Mining between 4 November 1966 to 4 November 1968. Activities included estimating reserves and metallurgical testwork at the La Oroya smelter.

Charter Consolidated Limited (Charter) first visited Berenguela in June 1968 and took out a purchase option in December 1968. By February 1970 Charter had carried out 56 diamond drillholes over a total length of 3,386 m, and 5,108 m of underground channel sampling (1.5 m lengths) for metallurgical testwork and a feasibility study was completed (Kalcov and Waddle 1970).

Due to a failure to fulfil the schedule of operations set forth in the then Peruvian General Mining Law, Lampa Mining forfeited the project on 30 September 1970. Ownership reverted to the State and on 19 January 1972 ownership passed to the government owned Minero Perú S.A.

6.2.3 Privatization and recent owners / operators

In 1995, a policy of privatization was adopted by the Peruvian ministry responsible for Minero Peru, with the result that the Property was offered for sale by the state company. KCA purchased the Property in 1995 by competitive bid and formed a private Peruvian company, SOMINBESA to manage the project. Following acquisition of the Property, KCA conducted a surface bulk-sampling program between 1995 and 1997, collecting two bulk samples for hydrometallurgical testwork.

In March of 2004, Silver Standard, now SSRM, entered into an option agreement with SOMINBESA to purchase 100% of the silver resources contained in the Berenguela Project. Silver Standard agreed to pay US$200,000 and issue 17,500 common shares of Silver Standard. In addition, Silver Standard was required to carry out an exploration program estimated to cost a minimum of US$500,000 to expand the property Mineral Resource, complete a resource estimate in accordance with National Instrument 43-101 and initiate prefeasibility work.

Between 2004 and 2005 Silver Standard completed the exploration commitments, by undertaking 222 hole RC drill program and a Mineral Resource estimate reported under NI 43-101.

In January 2006 Silver Standard signed a share purchase agreement to acquire 100% of SOMINBESA for aggregate payments of US$2M in cash and US$8M in shares of Silver Standard, with KCA retaining a 2% NSR royalty on copper production, capped at US$3M.

Silver Standard completed an exploration drill program in 2010 and a resource development focused drill program in 2015.

In February 2017 Silver Standard announced that it had entered into a definitive agreement to sell 100% of SOMINBESA to Valor, an Australian listed company for aggregate consideration of US$12M in deferred cash, a 9.9% equity interest in Valor and the requirement for Valor to raise US$8M for project expenditures.

Between 2017 and 2018 Valor completed an RC drilling program of 67 holes, two JORC (2012) resource estimates, geochemical surveys, and a scoping study. The 2018 estimate incorporating all that drilling was reported in the 2018 Valor JORC report and is discussed in Section 6.3.

In January 2019 Valor signed a joint venture option agreement with Kennecott Exploration Company, later assigned to Rio Tinto Mining and Exploration (Rio Tinto), for US$700,000 in cash payment and US$2M in exploration, after which Rio Tinto could elect to form a 50:50 joint venture with Valor by paying an additional US$3M to Valor. Rio Tinto could further elect to sole fund US$5M on the Project over three years to earn an additional 25%. In 2019 Rio Tinto completed four diamond drillholes for 1,427 m, collected 707 geochemical samples and relogged 15 historical drillholes. In January 2020 Rio elected not to continue with the option agreement.

All the above programs are further discussed in Sections 9 and 10.

In March 2020 Valor was unable to meet required cash payments and SSRM commenced transfer of the ownership of SOMINBESA back to SSRM.

On 1 October 2020 Aftermath announced it had signed an acquisition agreement with SSRM to purchase 100% of the Berenguela silver-copper through the purchase of 100% of the shares in SOMINBESA. Final closing of the Transaction is expected to take place on or before 24 November 2026.

6.3 Historical resources

There have been several unpublished and published Mineral Resource estimates on the Berenguela Property.

The first recorded estimate was made by ASARCO in 1966 and reported as 8,000,000 t at 4.4 oz/t silver and 1.37% copper (Kalcov and Waddle 1970).

Charter had a reserve estimate completed for Berenguela in 1969, reported in Strathern (1969). The estimate was based on a sectional-polygonal estimate using underground sampling and drillhole data on vertical cross sections spaced 50 m apart, resulting in an estimated 14,329,514 t at 124 g/t silver and 1.32% copper. A second estimate was made using 5 m horizontal slices (maps) and only the drillhole data, producing a reserve of 13,867,453 t at 127 g/t silver and 1.31% copper. Both estimates used a density of 2.47 t/m^3 and a 9.1% moisture content. The drilling was not analyzed for manganese; hence manganese was not estimated.

In December 1980 Minero Perú, using the ASARCO and Charter drill data and additional metallurgical testwork undertook a pre-feasibility study, in which the estimated mineable reserves in two open pits were determined to be 11.145 Mt at 4.46 oz/t silver and 1.32% copper.

For the estimates above the QP has not done sufficient work to classify the historical estimate as current Mineral Resources, the parameters are not available, and the Issuer is not treating the historical estimate as current Mineral Resources.

In October 2005, James A. McCrea, P.Geo., prepared a Mineral Resource estimate for Silver Standard using inverse distance squared to inform 5 x 5 x 5 m blocks, which is reported in the 2005 McCrea Technical Report. This is summarized in Table 6.2.

Table 6.2 Historical McCrea resource estimate summary – October 2005

Classification	Mt	Ag (g/t)	Cu (%)	Mn (%)	Ag (millions of ounces)
Indicated	15.6	132.0	0.92	8.8	66.1
Inferred	6.0	111.7	0.74	6.5	21.6

Notes:
- Effective date not stated but submitted date of Technical Report is 26 October 2005.
- Estimated using inverse distance squared interpolation method using a maximum of 16 composites.
- Silver grades were capped at 2,000 ppm, copper grades were capped at 4.5% and manganese grades were capped at 35%. Capping applied prior to compositing.
- Classification was based on distance 0 to 25 m for Indicated and 25 to 60 m for Inferred. Blocks outside these ranges are not reported.
- Reported using a 50 g/t silver cut-off.

The information above is presented as provided in the report cited. The QP has not done sufficient work to classify the historical estimates as current Mineral Resources and the Issuer is not treating the historical estimate as current Mineral Resources.

Valor updated the Berenguela Mineral Resource in January 2018 when the 2017 drilling was available. This was reported in the 2018 Valor JORC report dated 8 February 2018. The 2018 estimate used ordinary kriging (OK) to inform 5 x 5 x 5 m blocks to estimate separate grade shell domains.

The results are summarized in Table 6.3.

Table 6.3 Historical 2018 Valor resource estimate summary

Classification	Mt	Ag (g/t)	Cu (%)	Mn (%)	Zn (%)	Pb (%)
Measured	7.71	103.79	0.989	8.676	0.335	0.048
Indicated	28.23	80.45	0.734	5.161	0.296	0.066
Measured and Indicated	**35.93**	**85.46**	**0.788**	**5.915**	**0.304**	**0.062**
Inferred	**9.97**	**87.90**	**0.670**	**2.145**	**0.203**	**0.095**

Notes:
- For full details see Valor news release, dated 30 January 2018, to the Australian Stock Exchange (ASX), which summarizes the results presented in report titled "Technical Report and Updated Resource Estimate on the Berenguela Project, Department of Puno – Peru, JORC – 2012 Compliance" 8 February 2018, report to Valor by Mr Marcelo Batelochi, independent consultant, MAusIMM Competent Person.
- Prepared to comply with the 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC code).
- Grades are estimated by the OK interpolation method using capped composite samples.
- Bulk density has been estimated by Nearest Neighbour method and the average value is 2.82g/cm^3.
- The historical Mineral Resources uses a copper equivalent cut-off of 0.5%, copper equivalent ("CuEq") was based on the formula CuEq (%) = Cu (%) + ((Ag (g/t)/10,000) in ounces x Ag price x silver recovery)/(Cu price x Cu recovery) + (Zn% x Zn price x Zn recovery)/(Cu price x Cu recovery). Assuming: Ag price $16.795/oz and Zn $3,150/t and recoveries of Ag 50%, Cu 85%, and Zn 80%. Mn grades are not considered for CuEq calculations.
- Numbers may not add/multiply due to rounding.

The information above is presented as provided in the report cited. The QP has not done sufficient work to classify the historical estimates as current Mineral Resources and the Issuer is not treating the historical estimate as current Mineral Resources.

6.4 Production

There has been intermittent historical production predominantly by Lampa Mining which is discussed in Section 6.2.

In 1965 when Lampa Mining ceased operations records show that they had mined a total of approximately 500,000 tons and produced 3.24 million ounces of silver and 3,946 tons of copper.

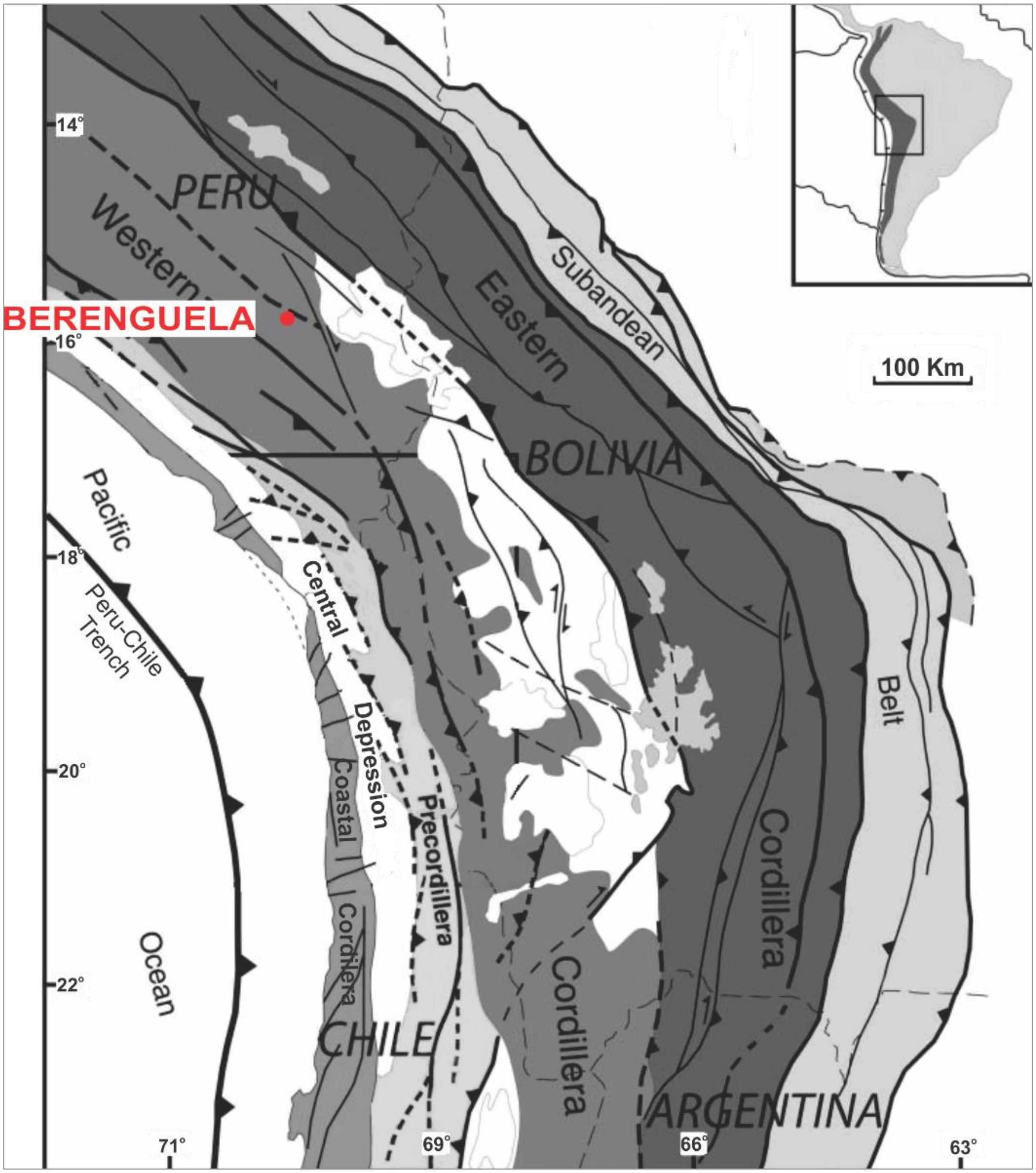
7 Geological setting and mineralization

7.1 Regional geology

The Property is located in the Santa Lucía district, in the Western Cordillera, also known as the Cordillera Occidental, on the western edge of the Andean mountain range, see Figure 7.1.

The major tectonic event, the Andino Orogeny, occurred in the Late Cretaceous, continuing into the Early Tertiary, uplifting, and folding pre-Tertiary sedimentary sequences.

Figure 7.1 Physiographic / structural belts of the central Andes with Property location



Source: After Garcia et al. 2011.

7.1.1 Regional mapping exercises

The region to the west of Lake Titicaca was mapped at 1:100,000 scale as part of the joint project between INGEMMET and the British Geological Survey between 1982 and 1986. The Property is located on the Lagunillas map sheet (Ellison and De La Cruz 1989). Based on this work a new regional stratigraphical and structural synthesis of the area was made, identifying seven distinct deformation events as described by Ellison et al. (1989).

Building on this work the geology and stratigraphy of the Santa Lucía district is described in Wasteneys (1990), who mapped the area at 1:50,000 as part of a doctorate at Queens University; this work introduced several new informal units. This is shown in Figure 7.2 as reproduced in Clark et al. (1990).

The following is a summary of the Santa Lucía regional geology synthesized from the references above.

7.1.2 Santa Lucía regional geology

The Western Cordillera was formed as a result of convergence or collisional plate tectonics which has been occurring since the early Mesozoic. The oceanic crust of the Nazca plate is being subducted beneath the South American plate.

Extension and subsidence east of the early Andean volcanic arc led to the development of a back-arc basin along the length of the Western Cordillera during the Jurassic. Since then, multiple episodes of sedimentary rock formation and subsequent exhumation and recycling have occurred.

Deformation in the Andean cycle in Peru has three main events: Peruvian (late Cretaceous), Incaic (end Eocene), and Quechuan (middle Miocene to Pleistocene). Ellison et al. (1989) identified five deformations in Quechuan event, not all of which are clearly identified in the Santa Lucía district.

The oldest recognized sediments are the Cabanillas Group, of Siluro-Devonia age. These are exposed in the Cabanillas High, to the NE of Berenguela. The Cabanillas High separates the Santa Lucía district from the Altiplano to the NE. It is bound to the east by the NW striking Laraqueri Fault. The basement of the Berenguela area is inferred to be the Cabanillas Group.

Events in the Western Cordillera are strongly influenced by the Lagunillas Fault Zone, which defines the eastern and southern margin of the Cabanillas High. North and east of the fault there are no outcrops of Jurassic strata due to erosion or non-deposition. The Lagunillas Fault is broadly arcuate in plan, changing from an Andean to an east-west trend and is terminated by the Laraqueri Fault at the southern end.

Continued uplift and erosion occurred during deposition of the Jurassic Lagunillas Group. Today this is only seen as fault bound NW striking slices in the associated with the Lagunillas Fault Zone. North and east of the Lagunillas fault there are no outcrops of Jurassic strata due to erosion or non-deposition.

Uplift of fault bound blocks of Jurassic sediments, followed by erosion with the onlap of the Cretaceous sequence occurred in the area of the Property. These include the Lower Cretaceous arenites of the Angostura Formation, also referred to as the Huancané Formation, and the carbonates of the Mid-Cretaceous Ayavacas Formation which host the Berenguela mineralisation.

Subsequent uplift and erosion during the Paleogene of the Cabanillas and Lagunillas Groups formed thick and extensive deposits of arenites and conglomerates of the Oligocene Puno Group. Puno Group continental clastics are well exposed in what appears to be a NW trending, 10 to 12 km-wide graben structure which now is marked by a topographic depression and Lake Lagunillas. A weak episode of folding termed the Quechuan D1 event affected the Puno Group strata. This ended the Peruvian deformation evet.

A largely quiescent period followed in the mid-Oligocene, with shallow water and subaerial eruption of mafic to intermediate predominately shoshonitic volcanics of the Yapoco and Piruani Formations. Volcanism was likely controlled by fissures associated with the NW trending structures. Clark et al. (1990) suggest that this volcanism started approximately 31 Ma and ceased around 26 Ma. Numerous mafic to intermediate, calc-alkaline (medium- to high-K) intrusive stocks, including the Limón Verde monzogabbro dated at 30.3 Ma, and dikes and sills of high-K andesite were also emplaced during this period. These middle Tertiary volcanics and probably co-magmatic intrusives are considered by Clark et al. (1990) to belong to the Tacaza Group.

A major uplift and subsequent erosion occurred in the late Oligocece / early Miocene. The Quechuan D2 orogenic pulse of Ellison et al. (1989) is marked by a flare-up of felsic pyroclastic volcanism, the eruption of the rhyolitic ignimbrites (partially welded lithic and pumice tuffs) of the Churuma and the Santa Lucía Formations of the Sillapaca Group. The main vents were probably in the NW of the Santa Lucía district, but distal pyroclastic facies were in part trapped in the Santa Lucía structure, a ca. 8-km-diameter roughly circular basin. This structure has been interpreted as a collapsed caldera (Ellison et al. 1989) and alternatively as a tectonically generated depositional basin that formed as a result of strike-slip displacement along the Langunillas Fault Zone (Wasteneys 1990). About 5 km north-west of Santa Lucía there is another circular body, 2 km in diameter, of polylithic breccias and weakly stratified felsic tuffs which have been interpreted to be a 26.5 Ma volcanic vent complex composed of diatreme breccias cut by dikes of phreatic and phreato-magmatic breccias. Referred to as the Santa Barbara Complex by Clark et al. (1990), the location of the second most significant mineral occurrence in the district at the Santa Barbara Mine, see Figure 7.2, and the presence of the diatreme relatively close to the Santa Lucía Structure gives support to the proposal that the latter feature is in fact a caldera-related structure.

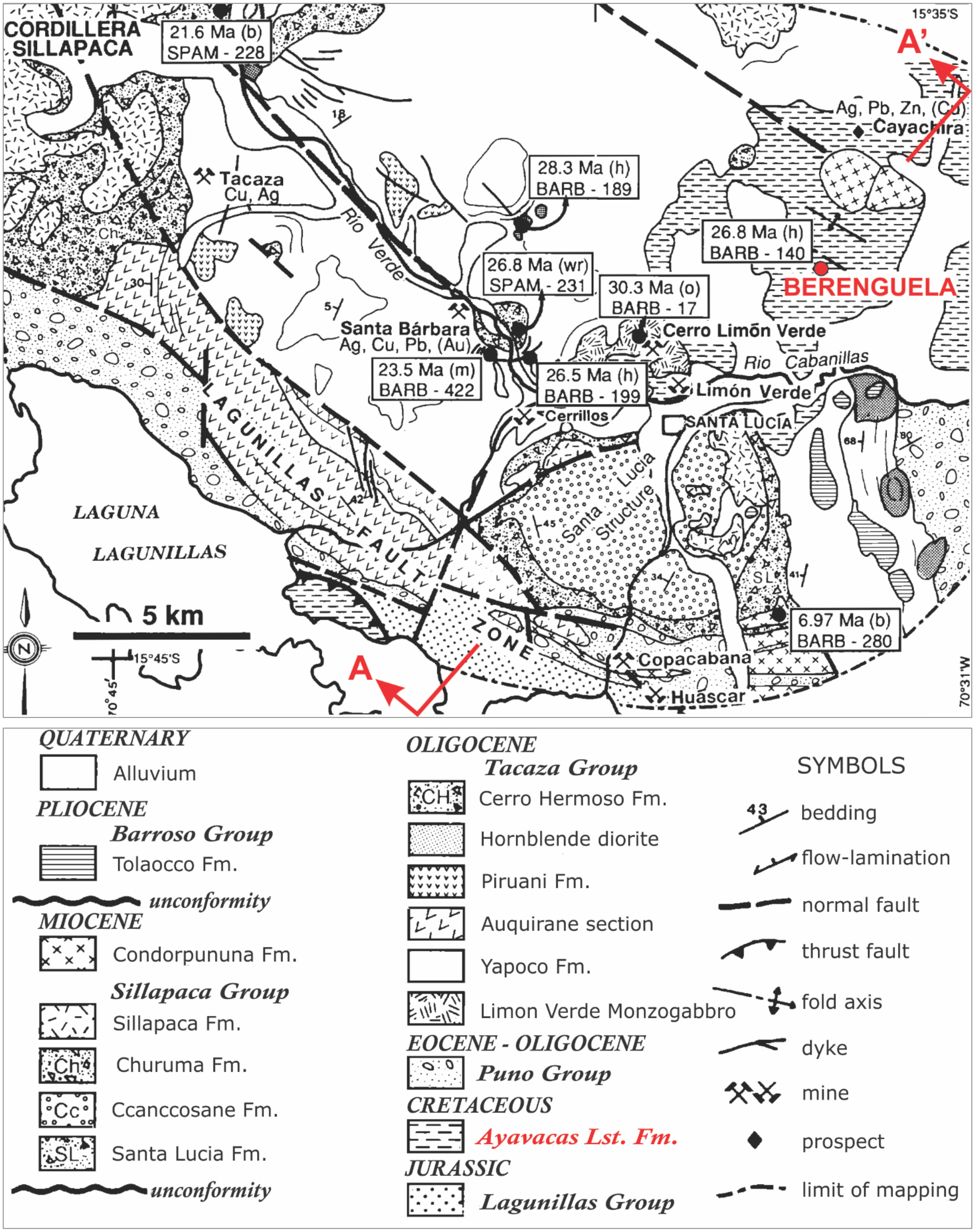
Further short-lived uplift and erosion was followed by eruption of the predominately dacitic lavas of the Sillapaca Formation. This volcanic event was brief in the Santa Lucía area, but included the emplacement of dacitic plugs in the pre-existing Santa Lucía structure.

Following an apparent protracted hiatus, volcanism resumed in the late Miocene, with the eruption of the shoshonitic Tolaocco Formation. In the Santa Lucía district this is limited to the emplacement of Monzogranitic porphyry dykes in the Santa Lucía structure.

The final phase in the district is the porphyritic intrusion of rhyolite and porphyritic rhyolite, bodies, and dikes, located in the southern margin of the Santa Lucía structure and the micro-granodiorite plug at Cerro Paco, NNE of Berenguela. These are assigned to the Condorpununa Formation.

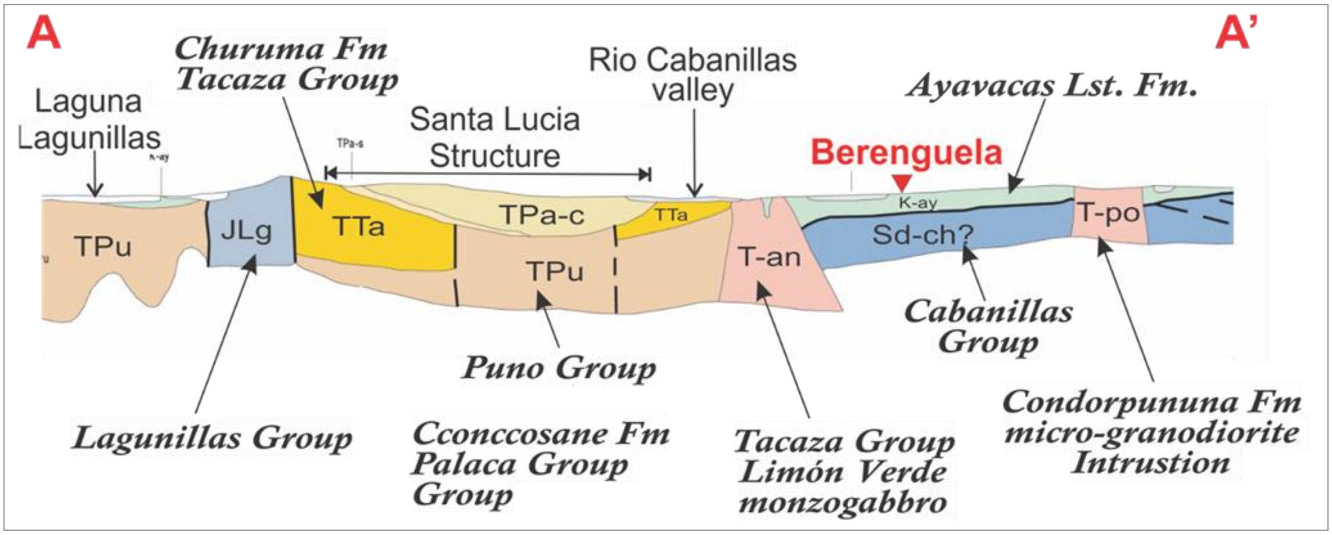
A regional cross section prepared by Ellison and Cruz (1989) passes immediately north of the Berenguela deposit, providing a useful interpretation of how the aforementioned units are currently placed in the regional architecture, as shown Figure 7.3.

Figure 7.2 Geologic map of the Santa Lucía district



Source: After Clark et al. 1990.

Figure 7.3 Santa Lucía regional cross section, looking north-west



Source: After Ellison and De La Cruz 1989.

7.2 Local and Property geology

7.3 Stratigraphy

The stratigraphy of the central core of the Property, and the location of the known mineralization, is dominated by the Mid-Cretaceous lower Ayavacas Formation, which forms a prominent whale-back ridge that stands above the lower lying pampa. The Ayavacas Formation comprises folded thickly bedded, light grey limestones and dolomitized limestones. Several WNW-trending bodies of black massive, patchy, and fracture-controlled manganese oxide replacement mineralization are emplaced in the folded limestones.

Interfingered with the carbonates are thin-bedded claystones and sandstones that generally are reddish in colour; a transitional unit called the Murco Formation.

Crystalline gypsum lenses are located with red mudstone along the entire length of the known mineralization.

Conformably underlying the Ayavacas Formation is the Mid-Cretaceous Huancané Formation, also referred to as Angostura Formation in some reports, consisting of reddish and locally green arenites and evaporites. This formation does not outcrop in the central project area but has been recognized in drill core below the mineralization. Thick sections of the Huancané Formation out crop near and to the west of the Quebrada Andamarca.

An example of Ayavacas Formation laminated limestone and massive dolostone is shown in core in Figure 7.4, and an example of barren crystalline gypsum alternating with red siltstones is shown in Figure 7.5.

Figure 7.4 Ayavacas Formation laminated limestone and massive dolostone

Note: 19BERE0003 420.30 – 427.80 m.
Source: Aftermath 2021 from Rio Tinto.

Figure 7.5 Barren crystalline gypsum alternating with red siltstones

Note: BER-A-09 74.85 to 82.28 m.
Source: Aftermath 2021 from Silver Standard.

The Oligocene Tacaza Group is the dominant outcrop in the northern half of the concessions and the south of the Rio Cabanillas. Tacaza Group overlies the Ayavacas Formation with an angular unconformity. Locally it comprises several units of intercalated andesite lavas, tuffs, and agglomerates. It has not been intersected in drilling.

7.3.1 Structure

Within the Property, the Ayavacas limestones are strongly folded as a result of a compression event during the Andean Orogeny. The anticlines and synclines have axial planes trending 105°-120° (west-north-west – east-south-east) and appear to be mostly open folds on the basis of the inter-limb angles, although isoclinal folds may also occur locally. Mapping data and geological interpretations based on drillhole information indicate that fold axes tend to be shallowly plunging.

A second phase of folding can be seen in the central part of the property where the axial planes of a syncline-anticline set of folds are oriented 045-060° (north-east-south-west), which suggests a north-west-south-east directed compression was superimposed on the earlier set.

It is noteworthy that the western end of the Berenguela deposit, where some of the strongest mineralization was developed is coincident with the projected intersection of the two phases of folding.

High angle block faulting occurs in the area and in places has resulted in rotating the strata from east-west to north-south. Nevertheless, the main axis of mineralization is east-west, and has been affected by two principal high angle faults trending N10-20° and N105-120°, producing a system of horst and graben offsets of mineralization.

A variety of breccia types are present characterized by substantial variations in clast lithology, clast morphology, clast abundance, matrix abundance and composition, and breccia body morphology. The distinction between hydrothermal or collapse breccias and sedimentary conglomerates / breccias is not currently distinguished.

Intrusive-pebble dykes, located in the central part of the deposit, comprise variably-rounded clasts of variable composition, and with rock flour groundmass. They are barren with no alteration halo. They likely represent a late, gassy magmatic process and possibly have a radial distribution.

7.3.2 Alteration and mineralization

The alteration mineralogy of a deposit is a key indicator of hydrothermal conditions associated with mineralization. While weathering has resulted in a near surface supergene layer, below, the hypogene sequence appears to be characterized by low temperature hydrothermal facies.

The limestones of the Ayavacas Formation at the deposit have been dolomitized to some extent, and then replaced to varying degrees by manganese. Manganese occurs as massive replacements, forming solid manganese mineralization (Figure 7.6) or as manganese oxide fracture infill in carbonate (Figure 7.7).

Figure 7.6 Example of high-grade massive manganese oxide at surface

Note: BED-001 0.00 to 2.20 m. Assay: 0 to 2.2 m @ 155 g/t Ag, 18.04% Mn, 1.64% Cu, 1.34% Zn.

Figure 7.7 Example of massive bounded by manganese oxide fracture infill in carbonate

Note: BED-002 50.64 to 53.20 m. Assay: 51.0 to 52.2 m @ 147 g/t Ag, 20.71% Mn, 1.58% Cu, 0.22% Zn.

The manganiferous decomposed limestones can be variably altered to clay to form earthy red to yellowish rocks depending on limonite content, with only 5 to 10% manganese, as shown in Figure 7.8. This example of moderate grade manganese oxide fracture infill in carbonate is bounded by low grade carbonate on the hangingwall and footwall. The yellow clay is known to the early miners as “panizo” and can contain high silver values (Strathern 1969).

Figure 7.8 Moderate grade manganese oxide fracture infill bound by low grade carbonate

Note: BED-002 67.5 to ≈71.8 m. Assay: 67.70 to 70.85 m 3.15 m @ 43 g/t Ag, 5.37% Mn, 0.83% Cu, 0.23% Zn.

The carbonates and mineralized material at Berenguela have been subjected to different degrees of hydrothermal silicification, but not skarn development. Silica-replacement of carbonates also occurs, principally by jasper, where it occurs in different colours; red, yellow, and black or variegated. Jasper typically occurs in narrow intermittent zones that trend in a somewhat acute angle to the trend of the mineralization. It may be associated with late-stage faulting and in places has partially formed around nodules of manganese oxide.

In addition, structures with low temperature silica (chalcedony and opaline quartz) are sometimes found with manganese oxide and oxide copper (malachite-azurite) mineralization. The other silicified structures are associated with barite-hematitie-jarosite.

7.3.2.1 Manganese

The main manganese minerals are psilomelane and pyrolusite. As manganese oxides are known to be effective geochemical "sponges", a number of manganese minerals are present containing significant amounts of copper and zinc, including:

- Chalcophanite $(Zn,Fe,Mn)Mn_3O_7.3H_2O$
- Pyrochroite $(Mn,Cu,Zn)(OH)_2$
- Lampadite $(Cu)_xMn(O,OH)_4.nH_2O$

Alabandite, a manganese sulphide is present but rhodochrosite and rhodonite are rare. The implications for ore genesis are discussed in Section 8.

Manganese was recognized early on as the most likely candidate to geo-metallurgically characterize the mineralization. ASARCO defined a visual classification based on visual manganese characteristics (Stathern 1969). Valor modified this to relate to three manganese assay intervals, these are shown in Table 7.1. These classifications were the basis of compositing metallurgical samples for testwork.

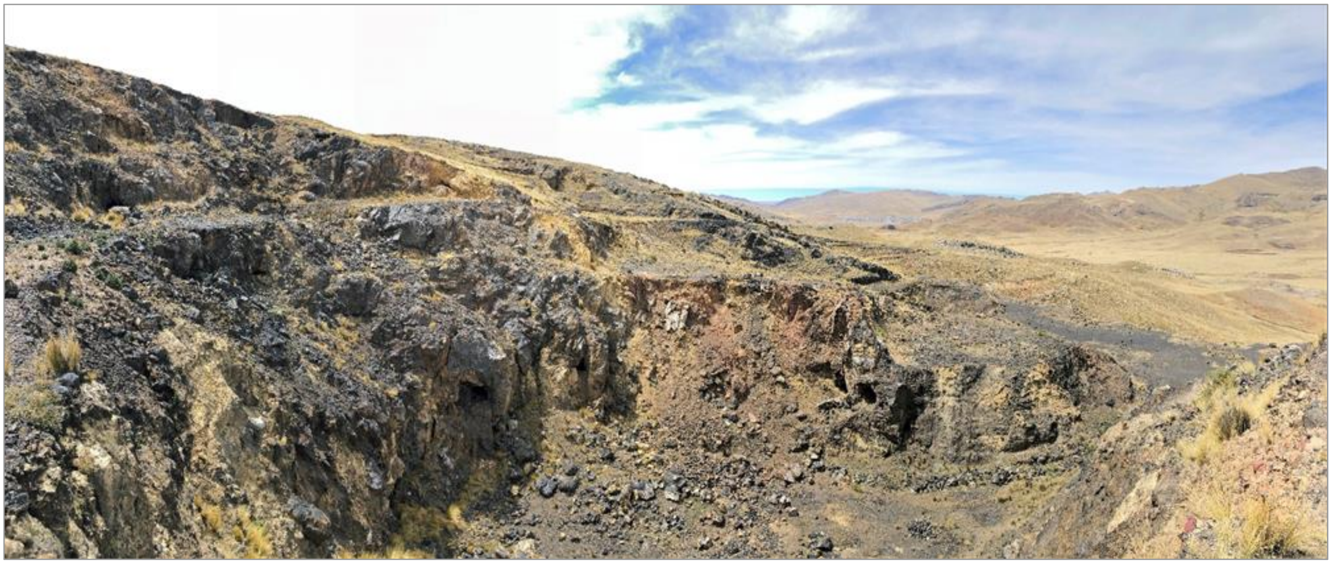
Table 7.1 Manganese geometallurgical classification schemes

	ASARCO visual manganese classification	Valor Mn assay classification
I	Yellow orange and red altered limestone comprising 50% percent Mn oxides by volume and hydrated Fe oxides	High grade, Mn >10%
II	Brown manganiferous hard ore with high dolomite content but relatively low grade	Medium grade, Mn 5-10%
III	Yellow friable material with less than 50% Mn by volume but high Ag content	Low grade, Mn <5%
IV	Yellow friable material with minor manganese and less than 1% combined metals; represents low grade	-

Note: Valor only had three classes.
Source: Aftermath from ASARCO and Valor reports.

Again, illustrating the gradations is a view of the main open pit at Berenguela, looking west. Manganese oxide on the left is flanked by zones of clay alteration (pale ochre) and iron oxide alteration (reddish brown) in the centre.

Figure 7.9 View of the main open pit at Berenguela



Source: photo supplied by Juan Carlos Fernandez Dec. 2020.

7.3.2.2 Silver

Studies on the deportment of silver by PMET (1996) and Rio Tinto (2019) suggested that silver occurs as disseminated silver sulphide – acanthite / argentite - as well as some minor unidentified silver sulphosalt species mostly in the manganese matrix, where there appears to be an association with alabandite as well as finely dispersed particles within psilomelane and pyrolusite. It was suggested that deportment may be as ultra-fine particles and / or in solid solution. Silver was detected within clays. Stromeyerite (AgCuS) and native silver were recognized in the 2019 MLA work.

7.3.2.3 Copper

The copper mineralization occurs both in association with manganese (pyrochroite and lampadite) and independently, as very fine sulphides such as chalcocite in transitional mineralized material. Copper minerals occur mostly as very fine sulphides chalcopyrite ($CuFeS_2$), chalcocite (Cu_2S) and bornite (Cu_5FeS_4), and near surface as oxide copper minerals (azurite, malachite and chrysocolla) and copper rich goethite.

7.3.2.4 Zinc

The limited information on the deportment of zinc shows that it occurs as sphalerite and as the aforementioned manganese oxide chalcophanite and pyrochroite.

7.3.2.5 Gangue mineralogy

The dominant gangue phase in the central mineralized area is dolomite 50 - 60%, with lesser amounts of calcite (10 - 20%), microcline and quartz, as well as trace quantities of the clays kaolinite and sericite (KCA 1996; Chapi 2017).

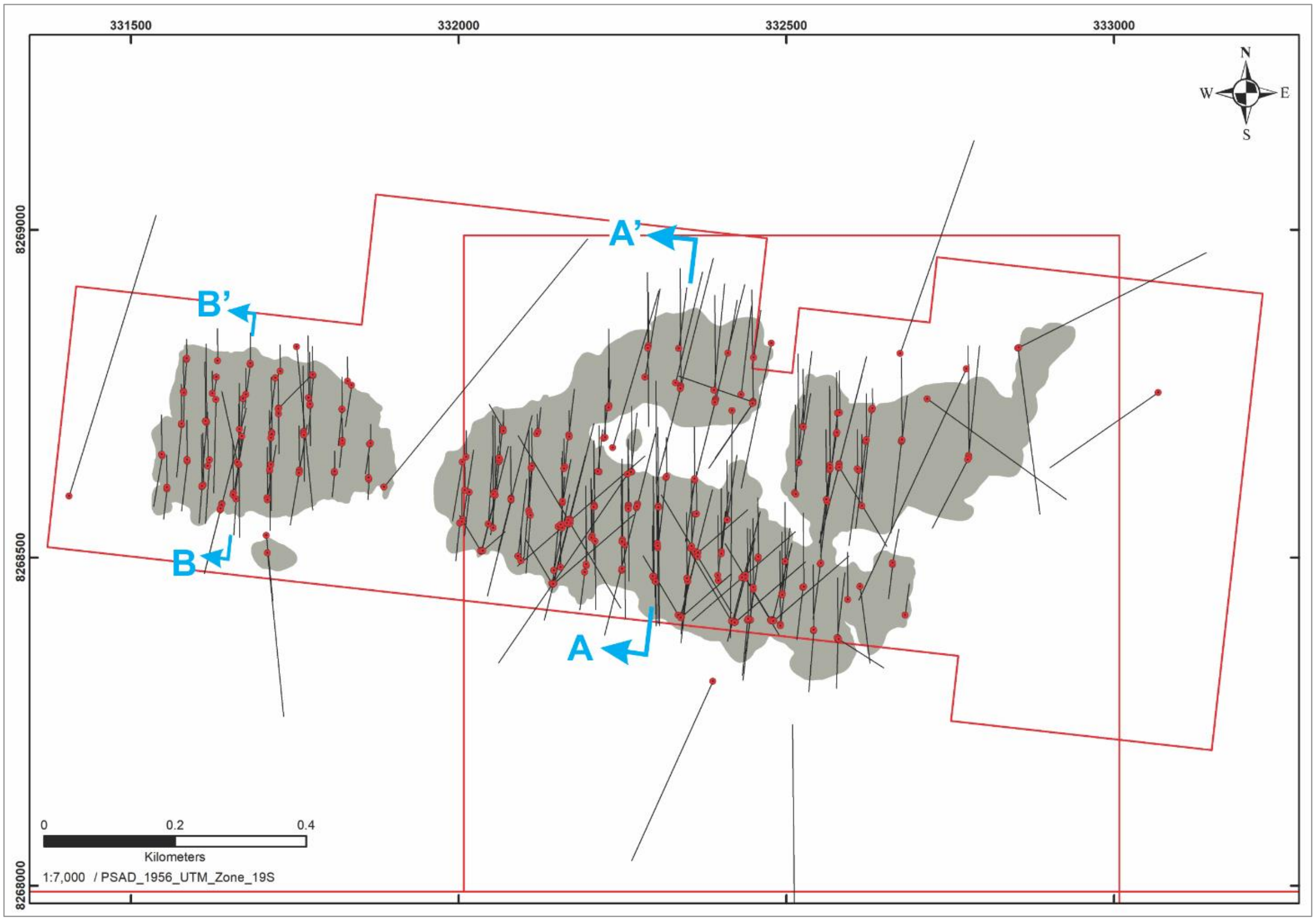
The carbonate strontianite ($SrCO_3$) has been confirmed by electron microprobe analysis, together with the presence of barite ($BaSO_4$).

7.3.2.6 Shape and attitude of mineralization

The shape and grades of the mineralization are represented by the following figures. Two section lines are shown in Figure 7.10 which also shows the outline of the manganese mineralization represented by a 2% 3D iso-surface. Collars and traces of the drillholes are also shown.

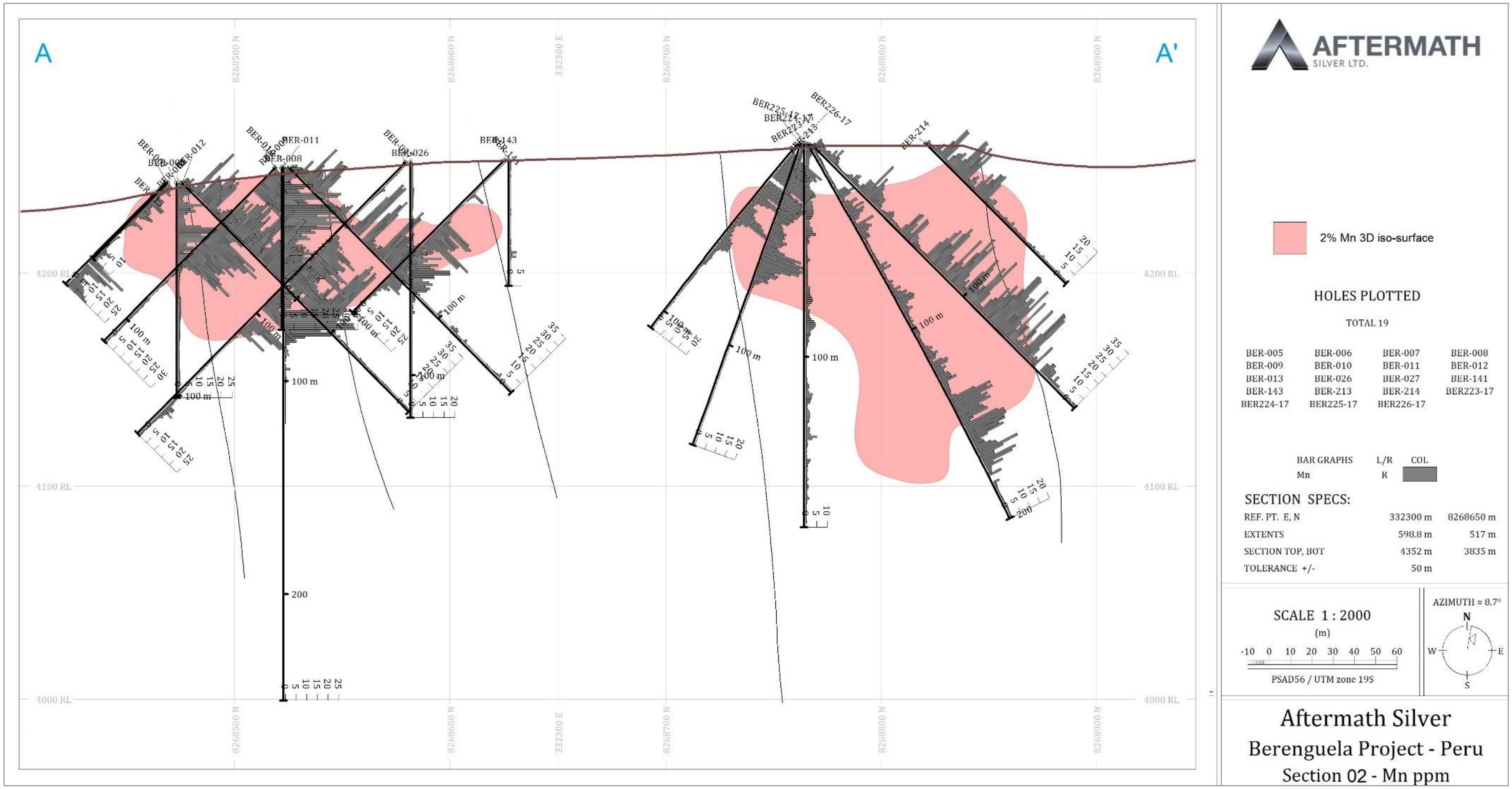
Figure 7.11 to Figure 7.16 are two representative cross sections, showing drill results as a histogram for manganese, silver, and copper respectively against a background of the 3D 2% manganese iso-surface. Section line A-A′ is through the centre of the deposit and section line B-B′ is through the west end of the deposit.

Figure 7.10 Manganese mineralization outline



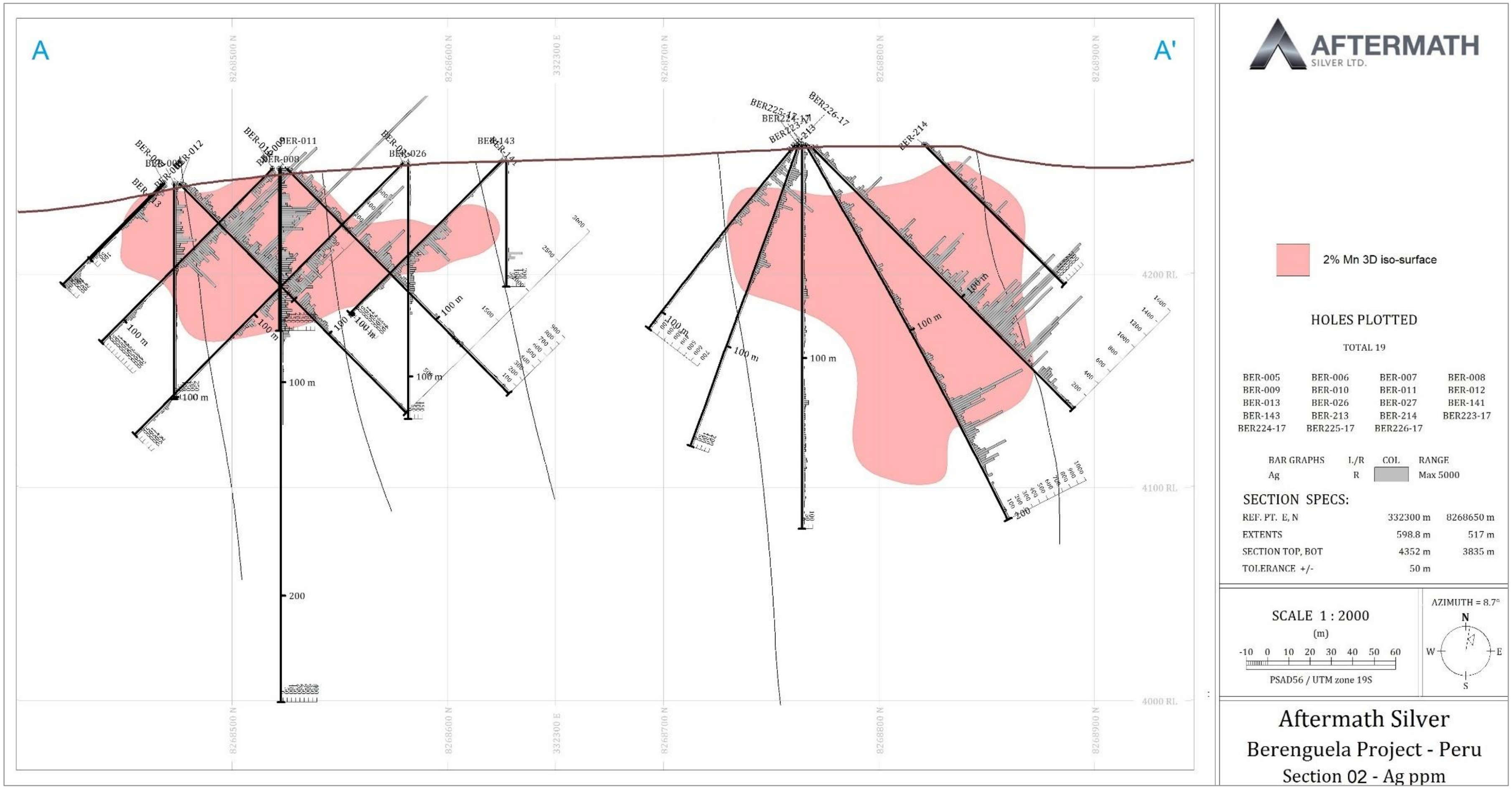
Source: Aftermath 2021.

Figure 7.11 Cross section A-A' showing manganese drill results



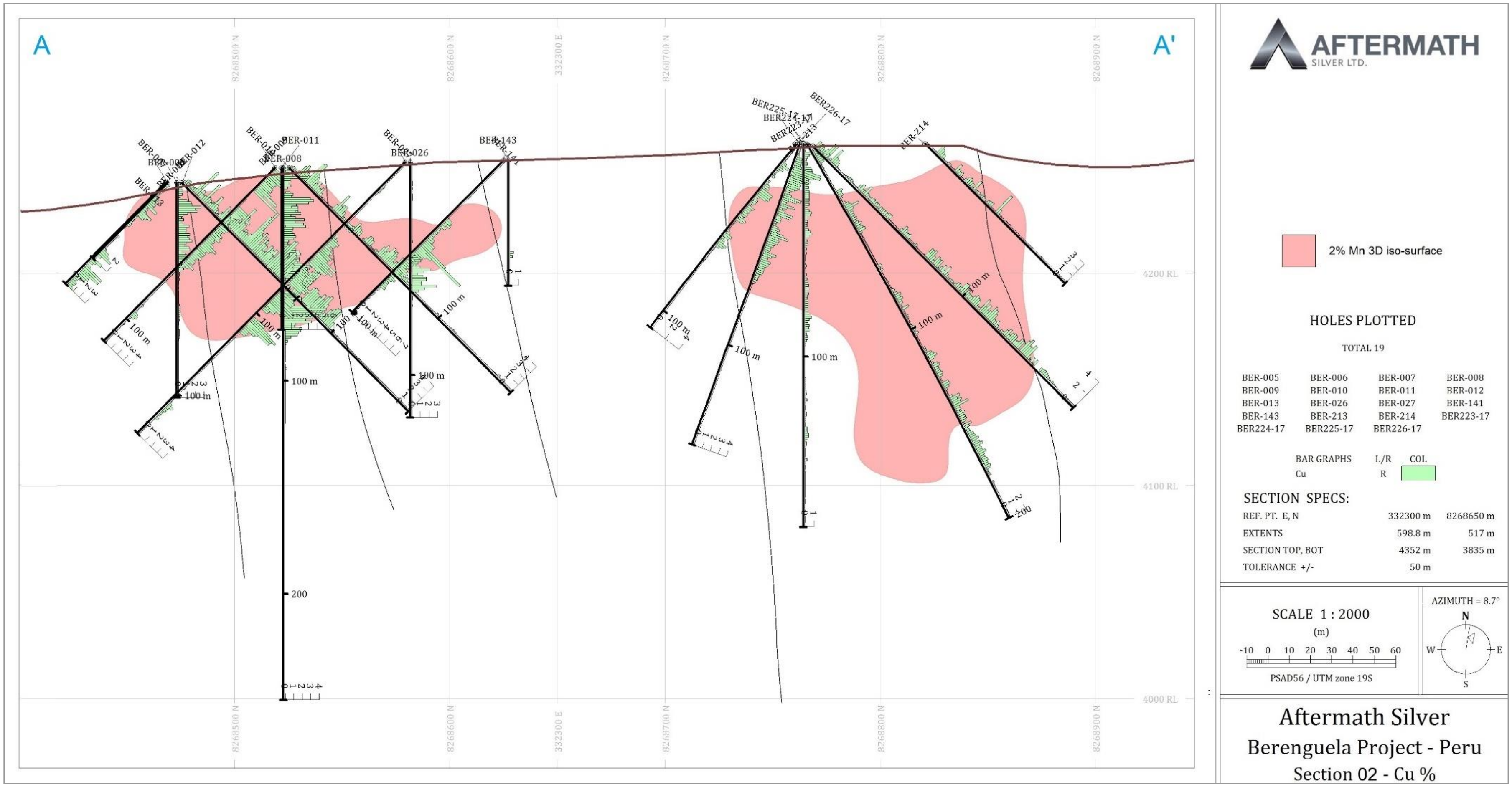
Source: Aftermath 2021.

Figure 7.12 Cross section A-A' showing silver drill results



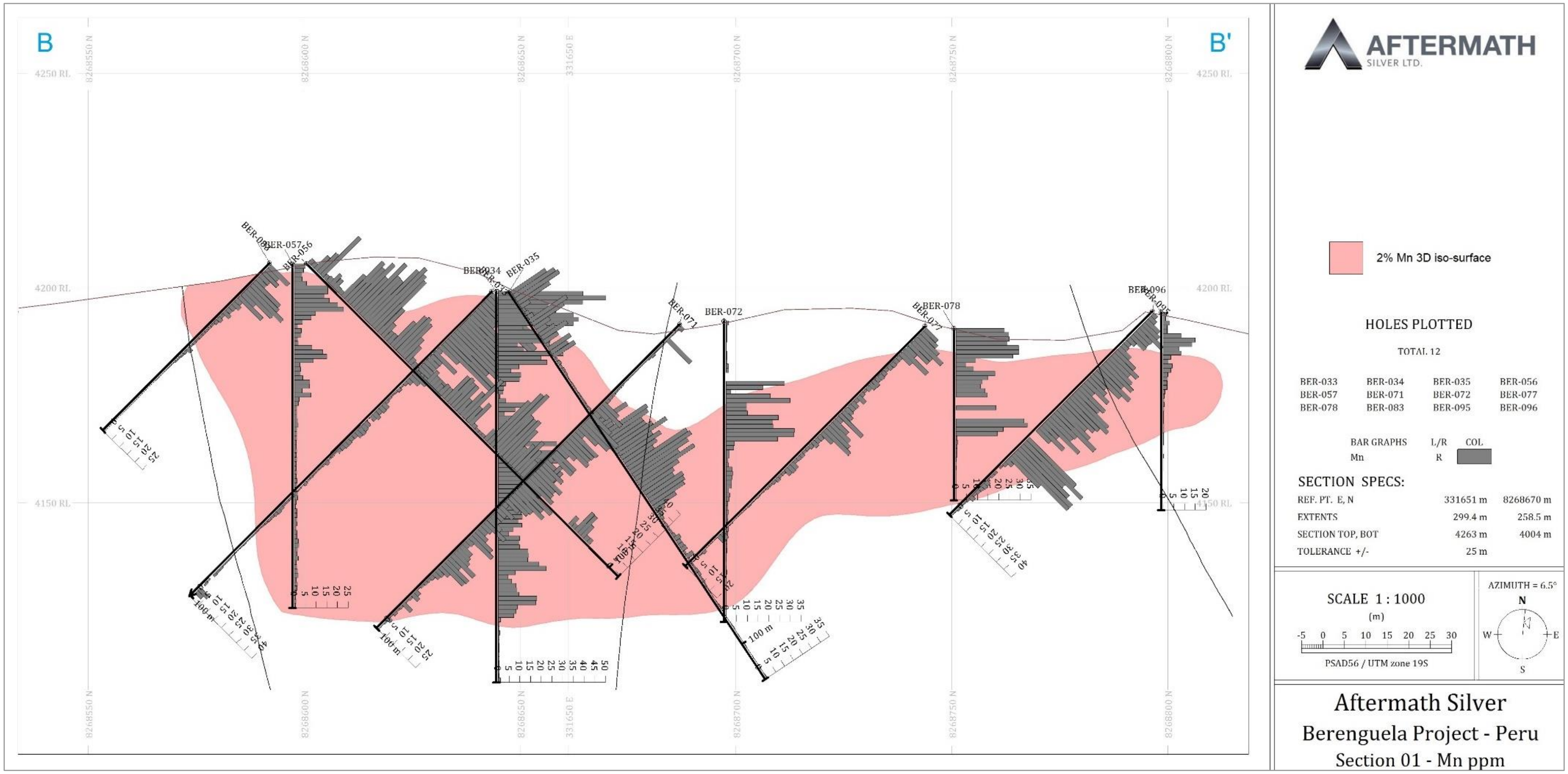
Source: Aftermath 2021.

Figure 7.13 Cross section A-A' showing copper drill results



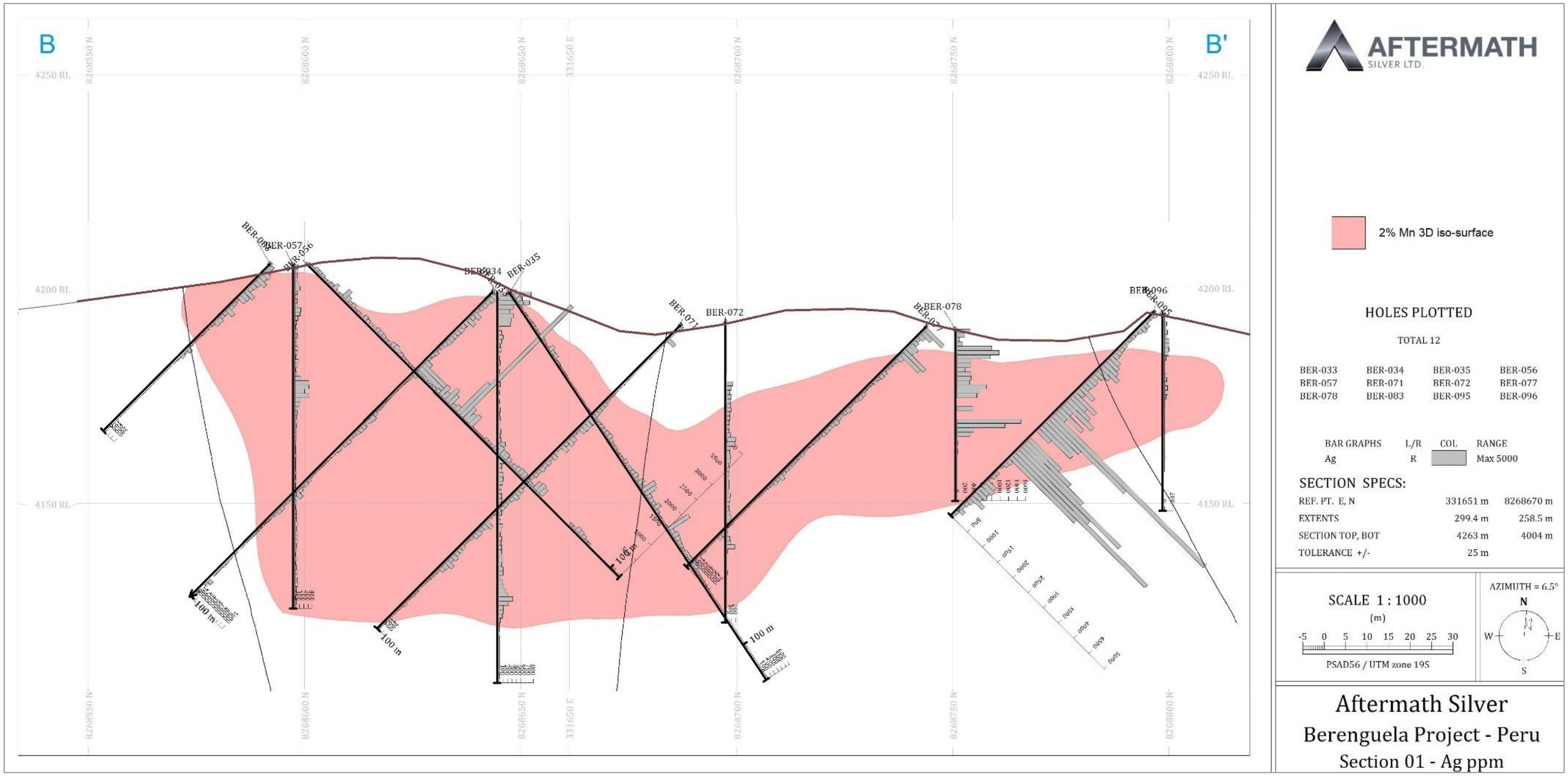
Source: Aftermath 2021.

Figure 7.14 Cross section B-B' showing manganese drill results



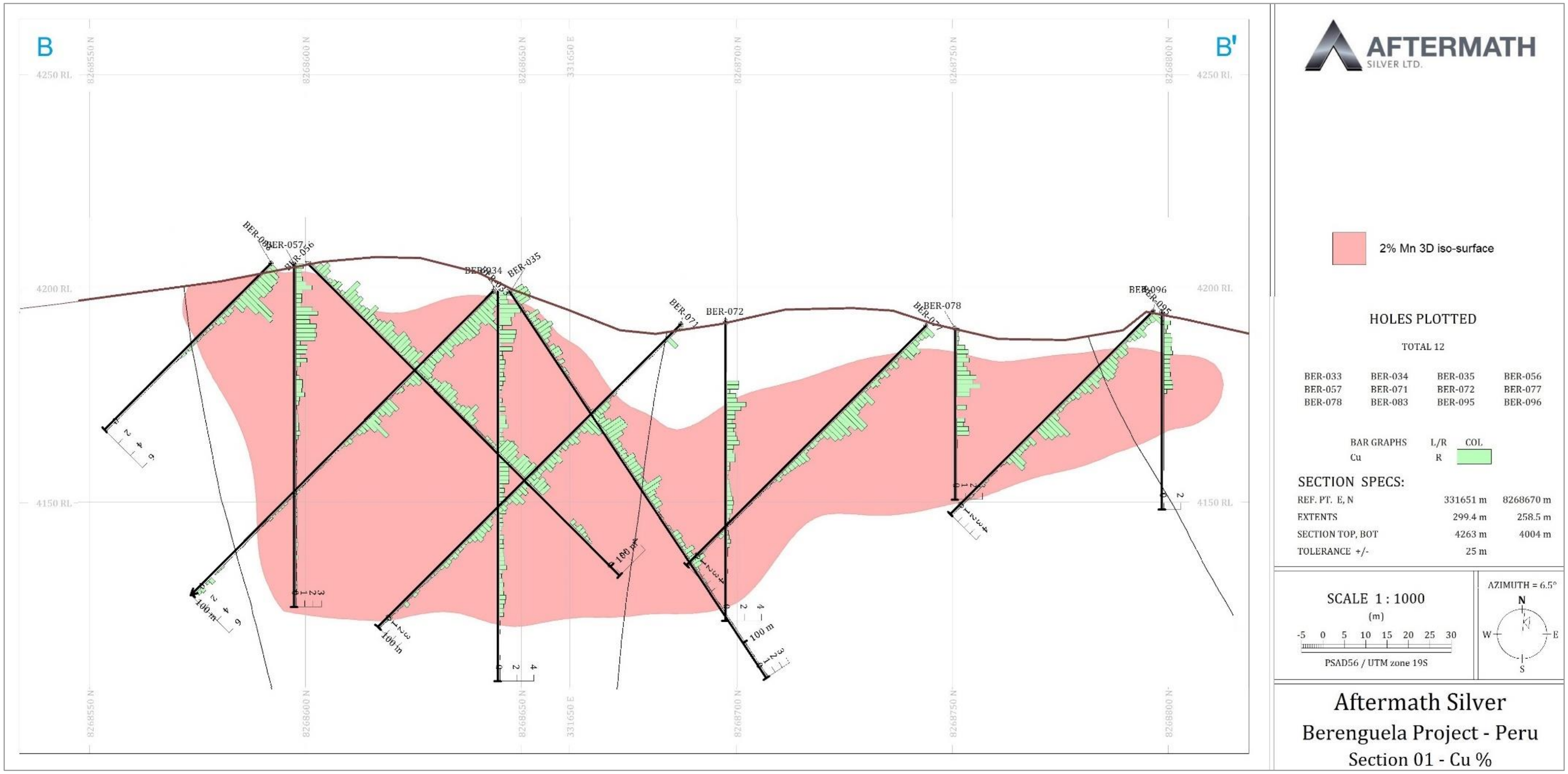
Source: Aftermath 2021.

Figure 7.15 Cross section B-B' showing silver drill results



Source: Aftermath 2021.

Figure 7.16 Cross section B-B' showing copper drill results



Source: Aftermath 2021.

8 Deposit types

There have been several contrasting genetic models advanced for the Berenguela Ag-Cu-Mn deposit. These are discussed along with the preferred carbonate replacement deposit (CRD) model currently proposed.

Candiottia and Castilla (1983) proposed that Berenguela is an exogenous infiltration deposit. Whereby, what at the time was believed to be conglomerates, thought to contain mineralized clasts from the hypogene Limón Verde Ag and Cu deposit located to the west, were gradually leached by meteoric processes, resulting in solutions rich in Ag and Cu percolating through the faults and fractures into the manganiferous limestones underlying. It has since been shown that what was thought to be conglomerates are pebble dykes / pipes.

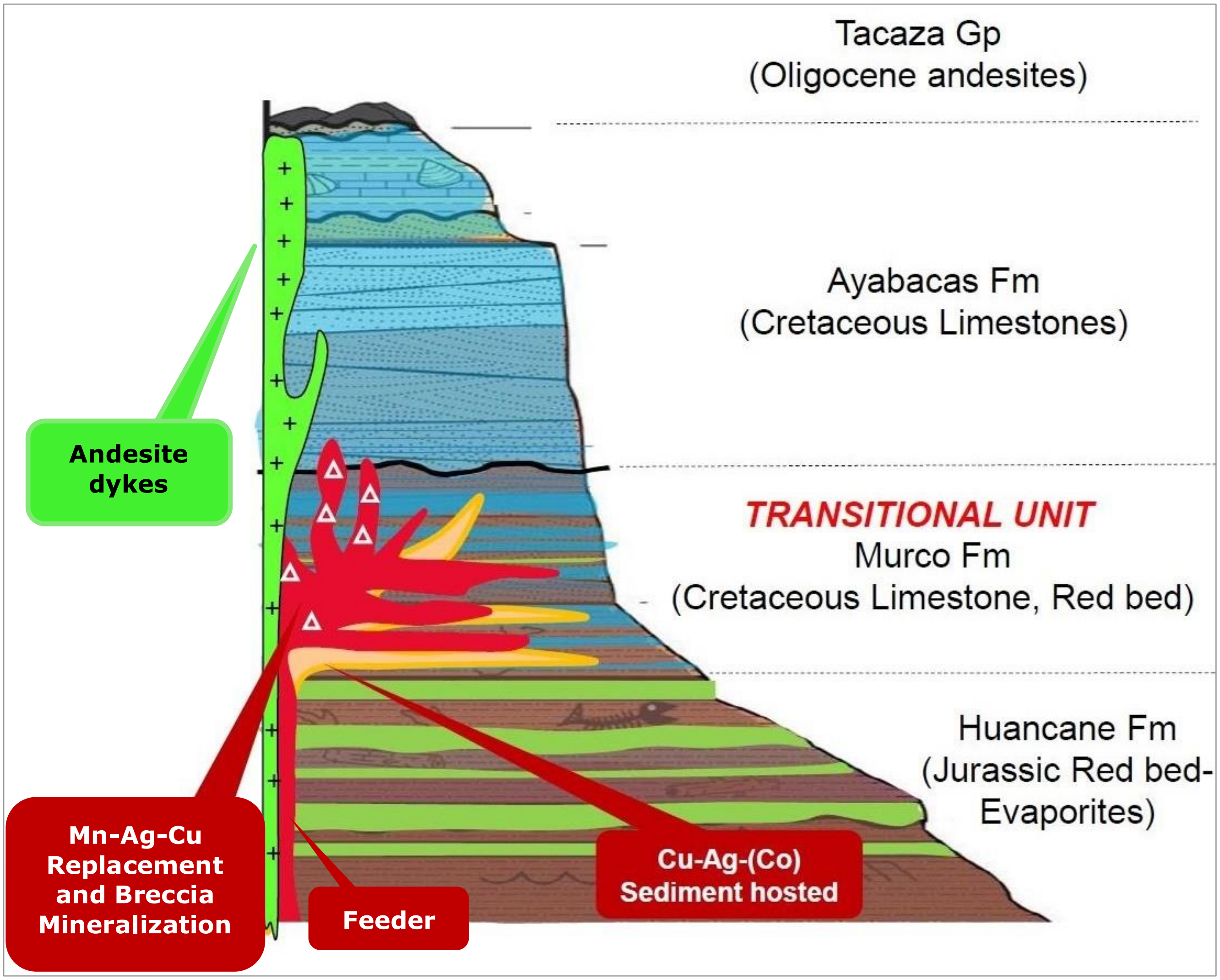
An alternate model was proposed by Clark et al. (1990) in which mineralization resulted from fracture-controlled metasomatism of the carbonate rocks, suggesting a direct relation to a subvolcanic intrusion. The basis for this interpretation is the presence of pebble breccia dykes / pipes in the mineralized zones at Berenguela and several of these bodies display marginal, fracture-controlled manganese replacement of the limestone and these fractures also carry copper and silver mineralization. These dykes are interpreted by Clark (1986) as phreatic breccias and similar breccias are associated with the epithermal silver deposits in this district. The final evidence of epithermal character at Berenguela is silicification associated with the manganese oxides, Candiotti, and Castilla (1983). The silicification is present as microscopic chalcedonic quartz grains.

Based on the latest information, the deposit model favoured by Aftermath is that Berenguela is a low sulphidation style base and silver bearing, lithology-controlled, CRD. Drilling conducted in 2019 located mineralized structures in the sandstone lithologies that lie below the mineralized carbonates. These are interpreted to represent fault-controlled fluid conduits (feeders), with the flow direction of the hydrothermal fluids enriched in Ag, Cu, Mn, and to lesser extents Zn, Pb, Ba, and Sr being sub-vertical. Upon intersecting permeable synclinal fold-hinges, the fluids migrated laterally into the dolomitic limestone as shown in Figure 8.1.

Possibly the closest deposit analogy to Berenguela is the Uchucchacua Ag-Mn-Pb-Zn deposits in the Western Cordilera of central Peru. The deposits at Uchucchacua, as described by Bussell et al. (1990), are hosted by folded and faulted Cretaceous limestones. These particular ore bodies represent the supergene, oxidized equivalents of structurally controlled replacement deposits in which the hypogene mineralization consists of a complex assemblage of anhydrous Mn-Fe-Ca silicates (Mn olivine, rhodonite, bustamite) partially replaced by Zn-Mn-Fe, Cu-Fe, and Pb sulphides (wurzite, alabandite, galena, pyrite) and carbonates (mangano-calcite, rhodochrosite) that together were overprinted by uncommon AgMn sulfosalts and sulphides (pyargyrite, uchucchacuaite). The supergene oxidation of the manganiferous replacement mineralization at Uchucchacua produced ore bodies rich in goethite, various Mn-oxides, and minor amounts of Pb-carbonates.

The replacement bodies of Mn ± Fe oxides at Berenguela might have formed in a similar manner as the supergene Mn-Fe assemblages at Uchucchacua. At Berenguela however manganese is present as oxides rather than the manganese carbonates (rhodochrosite) and silicates (rhodonite), suggesting the mineralization at Berenguela is a low temperature, oxidizing, near neutral mineralizing event. The absence of skarn or high temperature hydrothermal alteration minerals supports this interpretation. Hence Berenguela represents an unusual and possibly even unique type of hypogene Mn-oxide mineralization.

Figure 8.1 Interpretive deposit model for Berenguela



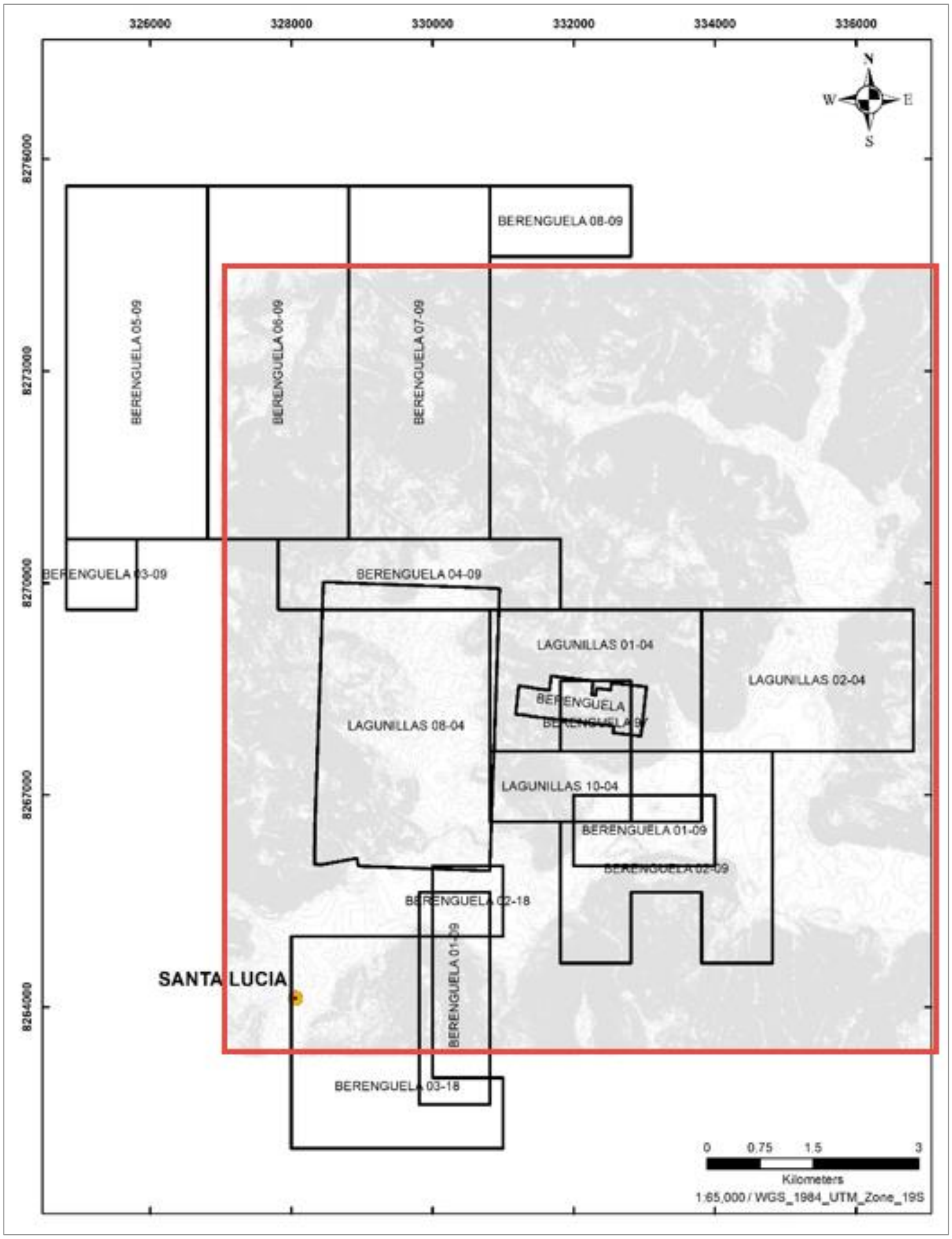
Source: Aftermath after Rio Tinto 2019.

9 Exploration

9.1 Topographical survey

The current topography is derived from GeoEye satellite data provided to Silver Standard as 2 m contours by PhotoSat in March 2011. The survey is centred on the Berenguela deposit, covering the area outlined in a red line and shown in Figure 9.1.

Figure 9.1 2005 Berenguela project topographical survey



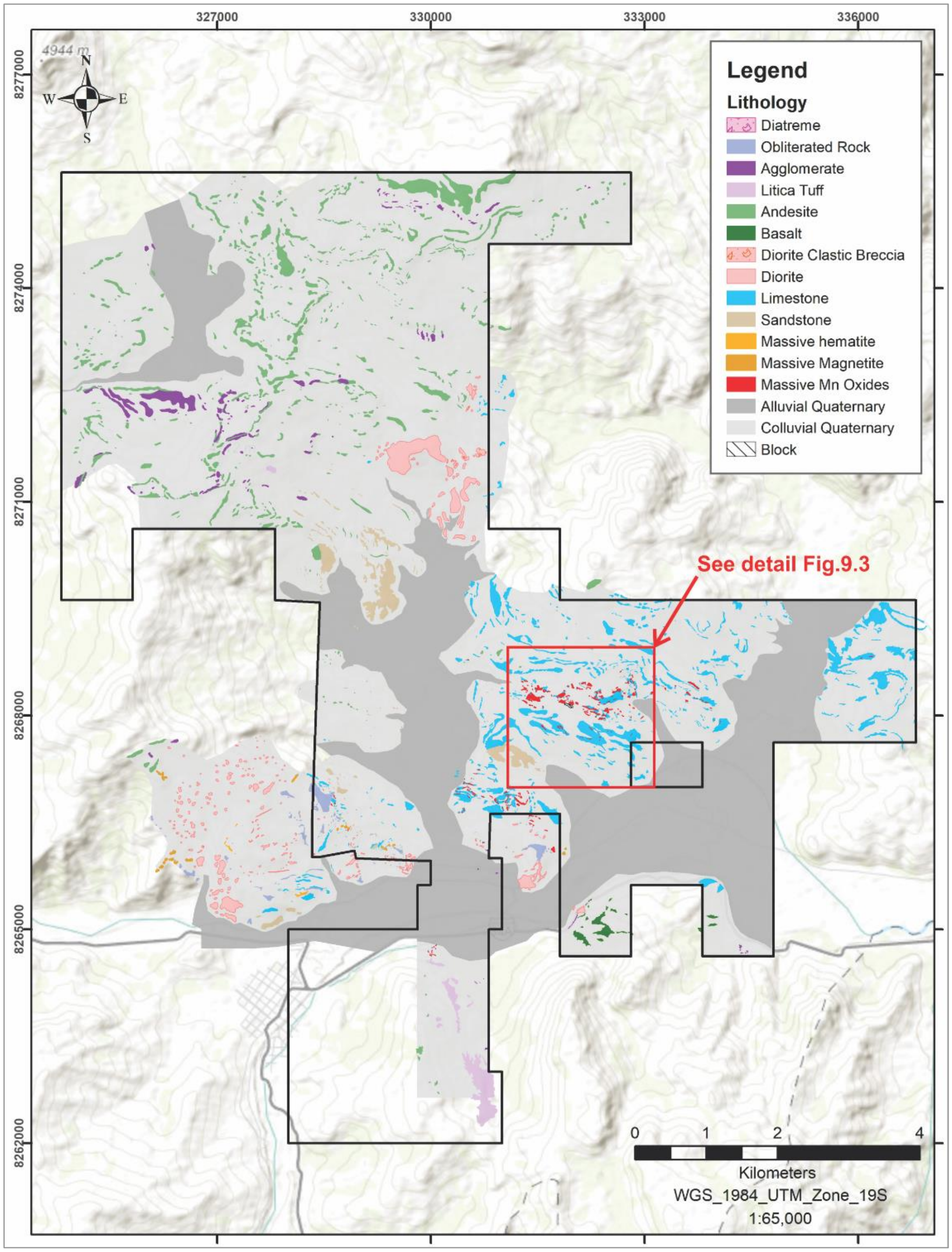
Source: Aftermath 2021.

9.2 Geological mapping

The mapping currently available is the result of several mapping programs by Silver Standard. The first of these occurred during the 2004 and 2005 drilling programs. Mapping began at 1:2,000 scale and was up-graded to a more detailed 1:1,000 outcrop map.

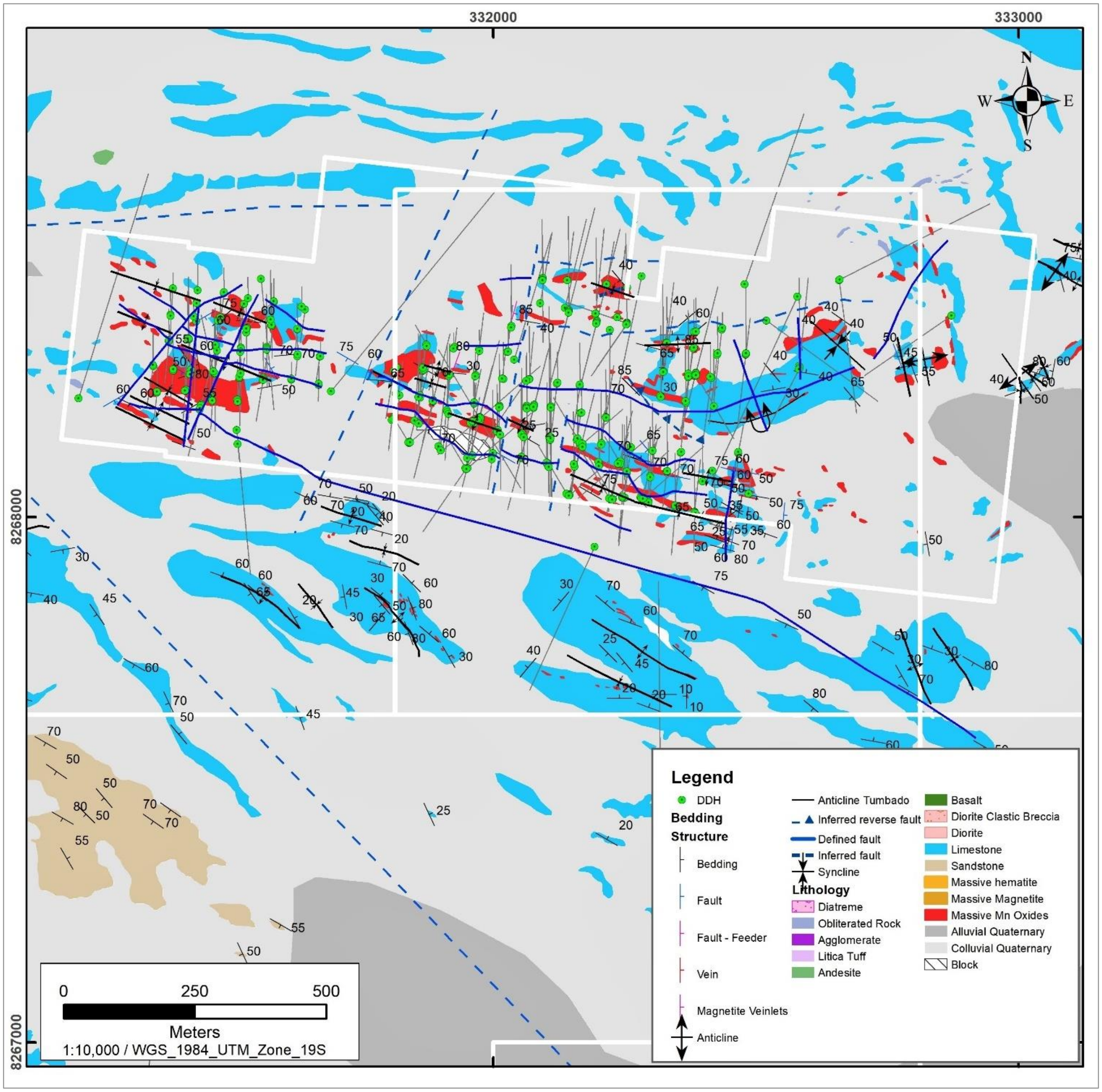
Most of the re-mapping was done before 2011 drilling campaign and updated in 2015. The geological mapping over the project is shown in Figure 9.2. Detail of the geology and structural data along with the drilling is shown in Figure 9.3.

Figure 9.2 Berenguela project geological mapping



Source: Aftermath 2021, from Silver Standard data.

Figure 9.3 Detail mapping over the mineralized area with drilling



Source: Aftermath 2021, from Silver Standard data.

9.3 Geophysics

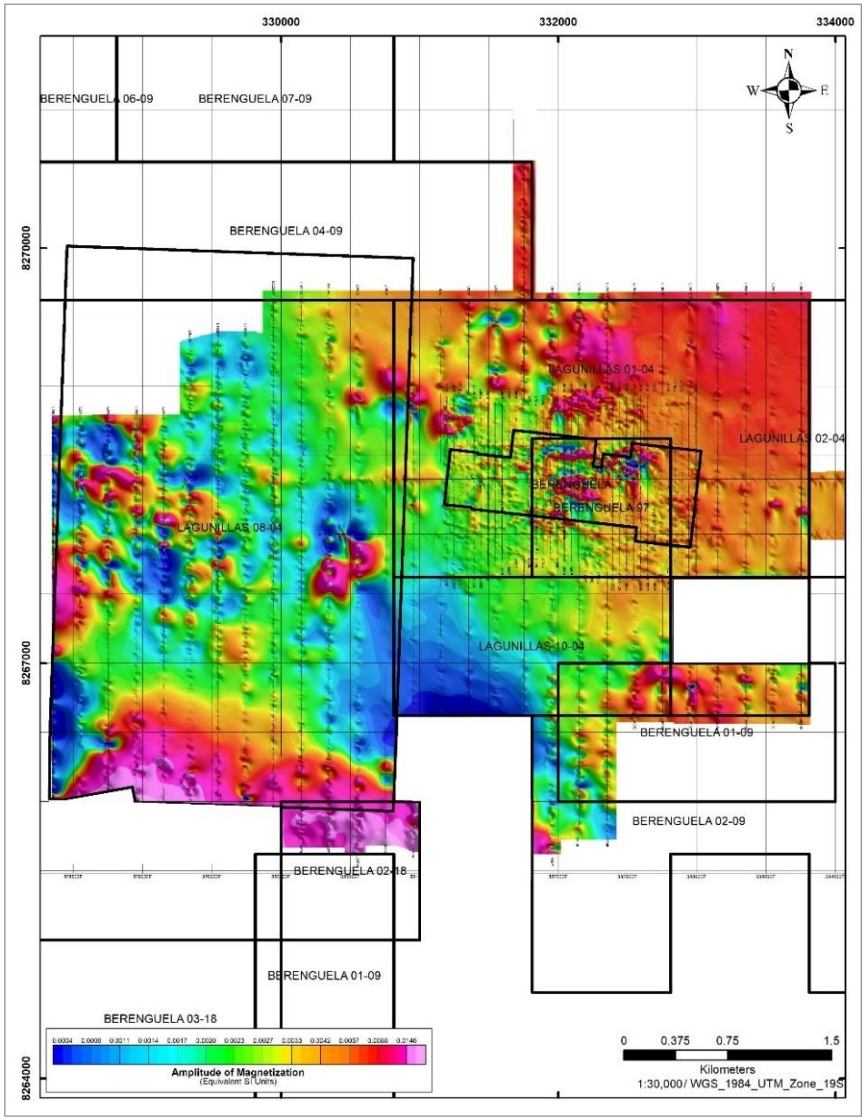
The geophysical programs were designed to characterize the response to mineralization, and create targets at depth and along strike. The geophysical programs over time and by operator are summarized below.

- 2009 Silver Standard (Arce Geofisicos 2009):
  - Ground microgravity on 50 m spacing, on six lines for a total of 22.7 km.
  - Total field magnetometer on 10 m spacing, along seven lines, a total of 23.75 km.

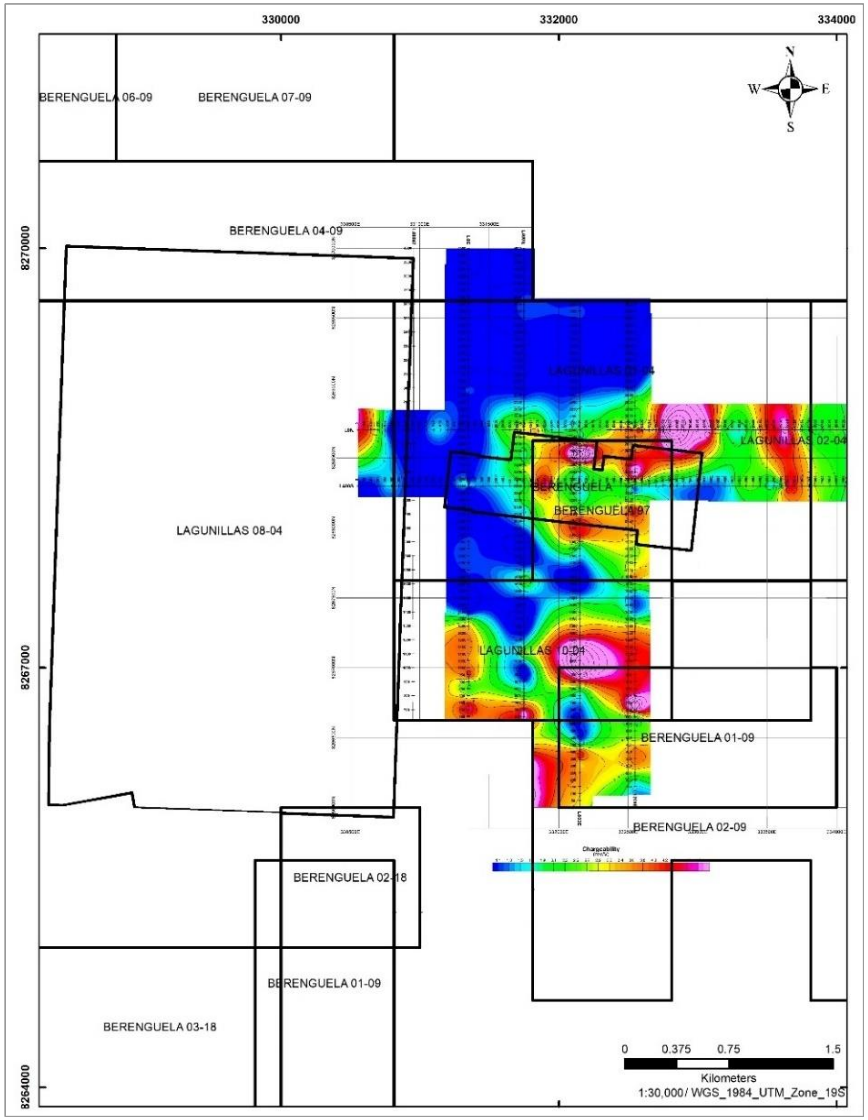
  - Induced polarization (self-potential, chargeability, and resistivity) with readings every 50 m, using pole-pole array electrode configuration, readings every 50 and 100 m on seven profiles, five NS and two EW, spacings of 50, 100, 150, 200, 150, 300, and 350 m. The 2D, 50 m depth slice is shown in Figure 9.4.
  - Induced polarization (self-potential, chargeability, and resistivity) with readings every 100 m, using pole-pole array electrode configuration, readings every 50 and 100 m on five NS profiles, spacings of 100, 200, 300, 400, 500, 600, and 700 m.
- 2010 Silver Standard (Arce Geofisicos and Zonge Ingenieria Y Geofisica 2019):
  - Magneto-Telluric survey on four lines. Modelling included 1D and 2D pseudo sections and 1D and 2D resistivity depth slices at depths of 100, 200, 300, 500, 750, 1,000, and 1,500 m.
- 2019 Rio Tinto (Arce Geofisicos 2019):
  - Total field magnetometer on 10 m spacing, along 43 lines, infilling the previous 2009 and 2010 surveys. Included processing and 3D modelling. Total magnetic intensity of the combined 2009, 2010, and 2019 data showing reduced to pole on the left-hand side and 50 m depth slice of chargeability on the right-hand side is shown in Figure 9.4.

Figure 9.4 Total field magnetic intensity, reduced to pole and 50 m depth slice of chargeability

Reduced to pole



50 m depth slice of chargeability



Source: Aftermath 2021 from Arce Geofisicos 2019 data.

9.4 Surface sampling

Prior to 2009 only minor amounts of surface rock chip sampling was performed. KCA took approximately 20 samples and Silver Standard 30 samples (Smith 2006). These results have not been compiled.

In 2009 and 2010 Silver Standard completed the first significant surface geochemical sampling programs. This was followed up in 2015 over an expanded area. In 2017 and 2018 Valor collected rock chip samples to confirm grades in outcropping manganese oxides in areas outside of the deposit area to help locate exploration drill sites.

There are a number of geochemical samples without co-ordinates. Quantities of the various surface sampling with co-ordinates that comprise the current project database base are provided in Table 9.1. These are shown in relation to the concession outline in Figure 9.5 and Figure 9.6.

Table 9.1 Current Berenguela Property surface geochemical database summary

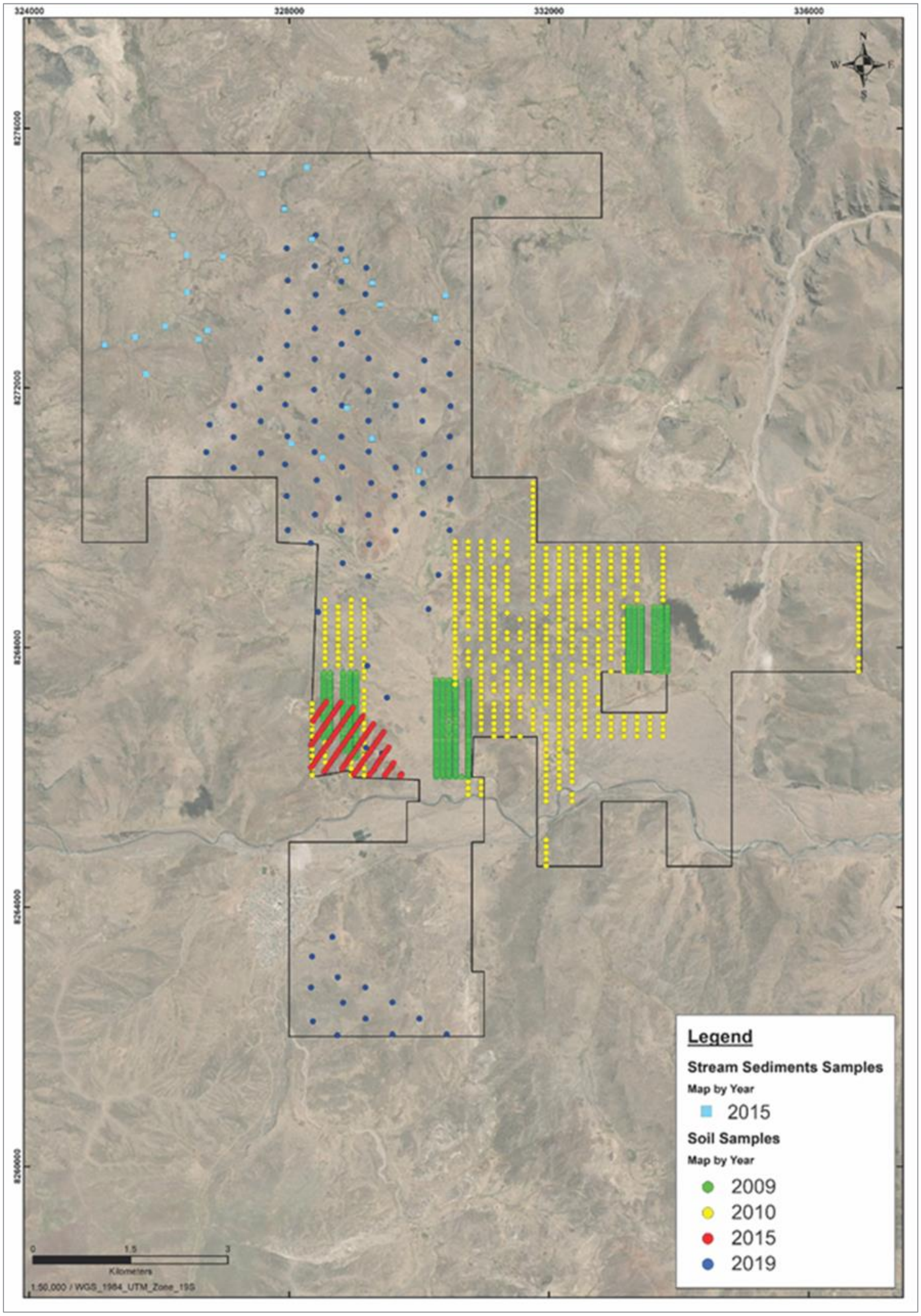
Year	Company	Rock chip & channel	Soil	Stream sediment	Dump / grab
2009	Silver Standard	589	1046	-	2
2010	Silver Standard	31	572	-	-
2015	Silver Standard	115	153	25	8
2017	Valor	85	-	-	-
2018	Valor	298	-	-	-
2019	Rio Tinto	28	90	-	4
Total		**1,146**	**1,861**	**25**	**14**

There are two prospects identified in the surface geochemical data outside of the historic Mineral Resource:

- Berenguela 2, with copper-silver-manganese anomalies.
- Berenguela West, with anomalies of gold-copper-silver-manganese.

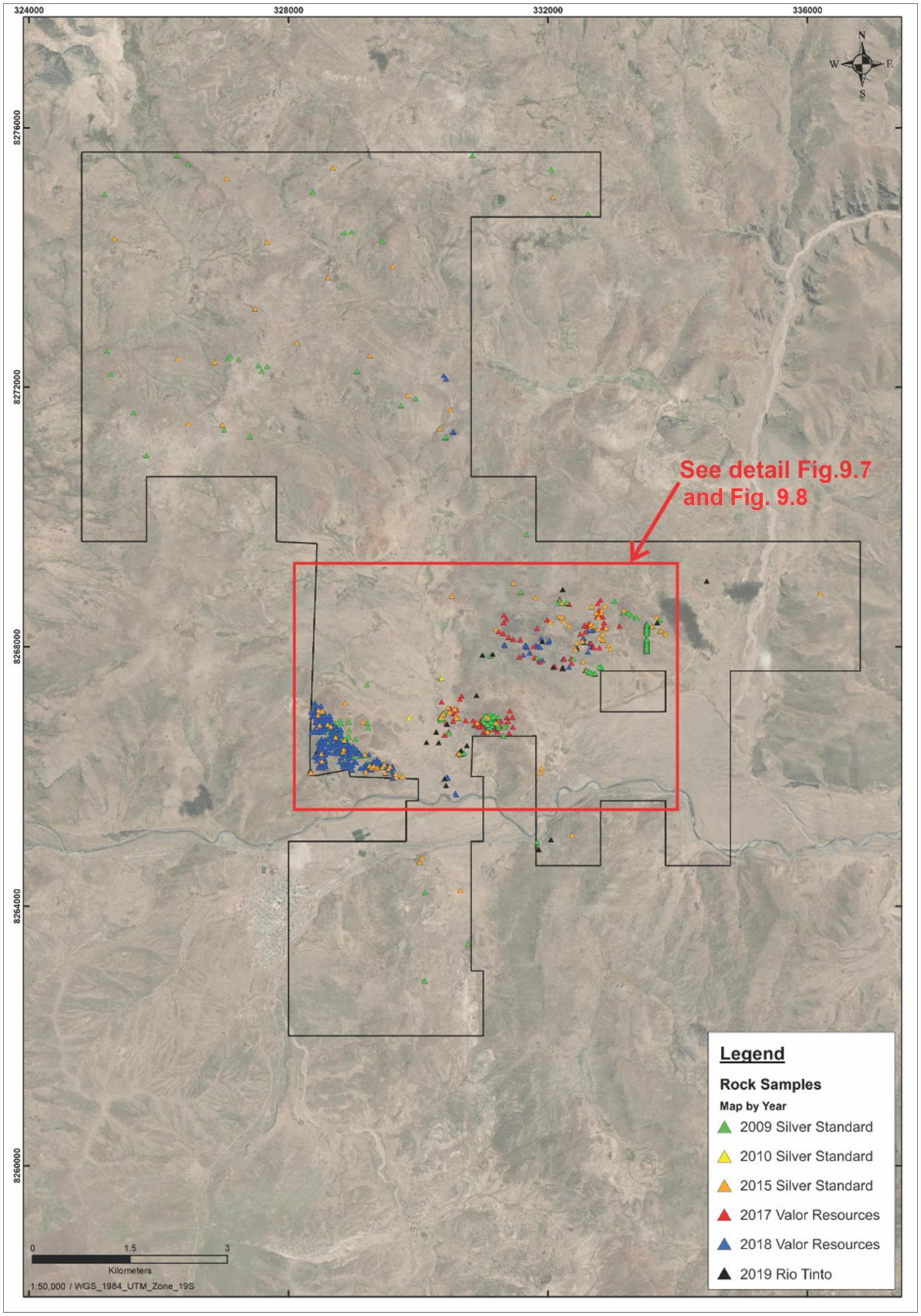
The location of the exploration prospects, showing manganese rock chip geochemical results over ground magnetics in Figure 9.7 and over mapping in Figure 9.8.

Figure 9.5 Surface geochemical sampling summary by year, soils, and stream sediments



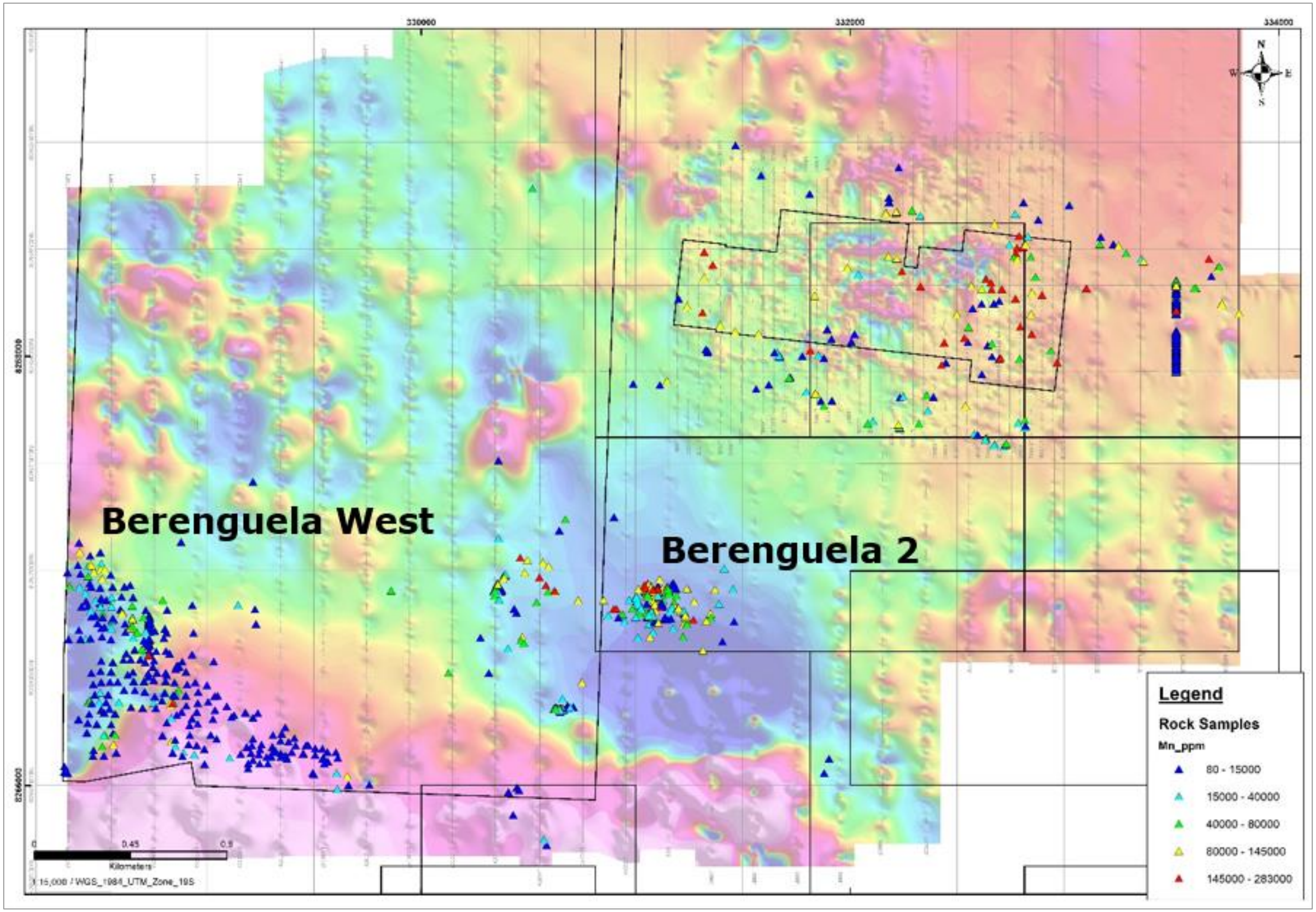
Source: Aftermath 2021.

Figure 9.6 Surface geochemical sampling summary by year - rock chips



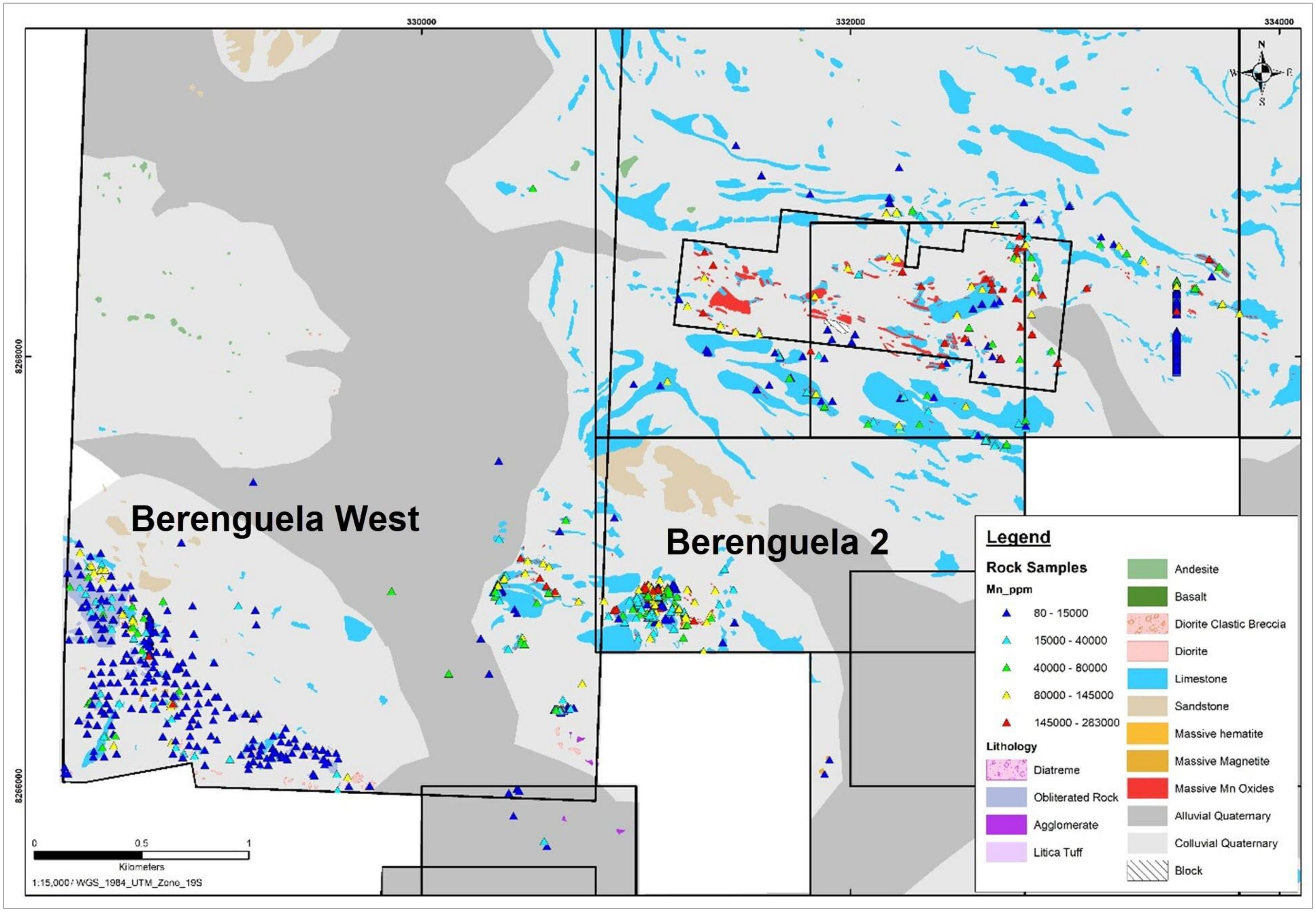
Source: Aftermath 2021.

Figure 9.7 Manganese rock chip results over a ground magnetics background



Source: Aftermath 2021.

Figure 9.8 Manganese rock chip results over a mapping background



Source: Aftermath 2021.

9.5 Silver Standard shaft sampling

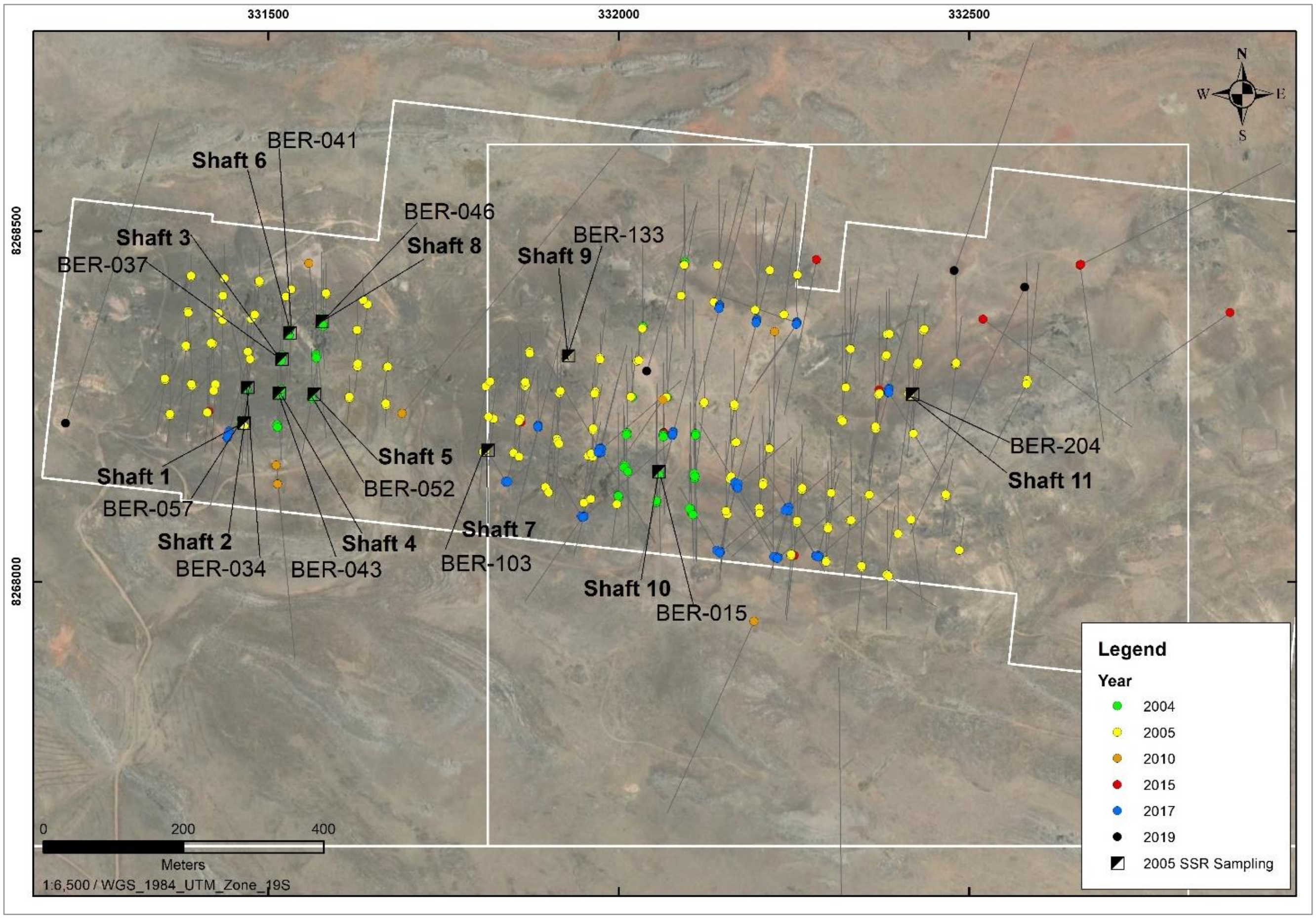
Between September and October 2004, Silver Standard completed 11 shallow shafts, with plan dimensions of 1.3 x 1.8 m. Nine shafts were mined to a depth of 10 m and two to a depth of ≈5 m, for a total of 100.7 m. The shafts were sunk by local mining contractors. Location of the shafts is shown in Figure 9.9.

The shafts were located at existing drill platforms, in proximity to a vertical RC hole. The mined material was stockpiled in 1 m intervals. Smith (2006) provides the transcribed assay results for these intervals, west and east detailed wall mapping. Samples were collected from each bucket hoisted to surface, placed on a rubber mat, mixed, and sampled.

A comparison of the silver and manganese assays for the shaft samples and the closest vertical RC hole are presented in Figure 9.10. These charts show that the absolute values are variable, particularly in the top 5 m, the differences may be for a number of reasons including the representativeness and homogeneity of the shaft sample and issues with RC return in the collar. However, notably, the results are more divergent for the 2004 holes (pre BER-058). For further discussion on this please see Section 10.6.

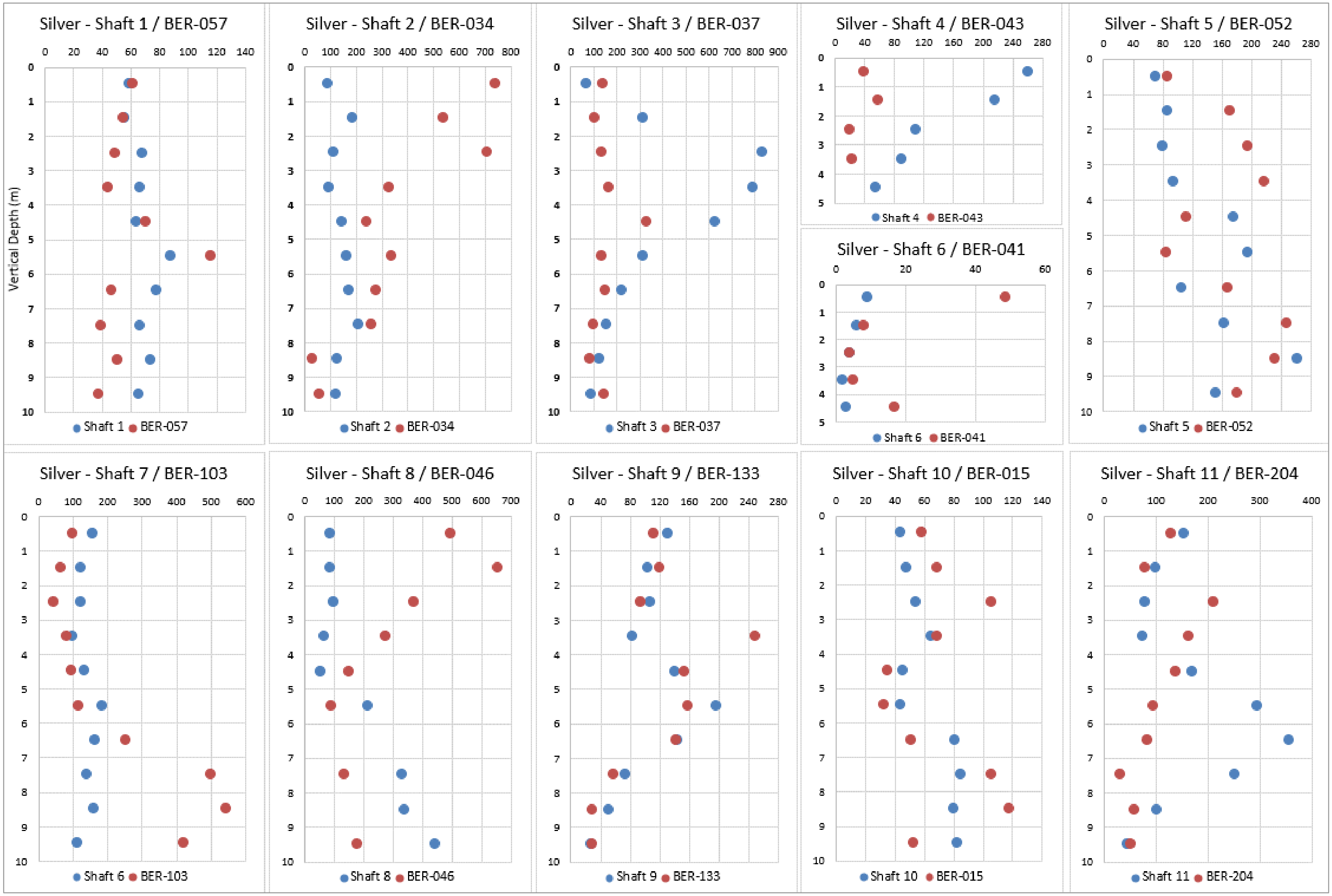
Upon completion of the work the shafts were back filled.

Figure 9.9 Location of Silver Standard bulk sample shafts



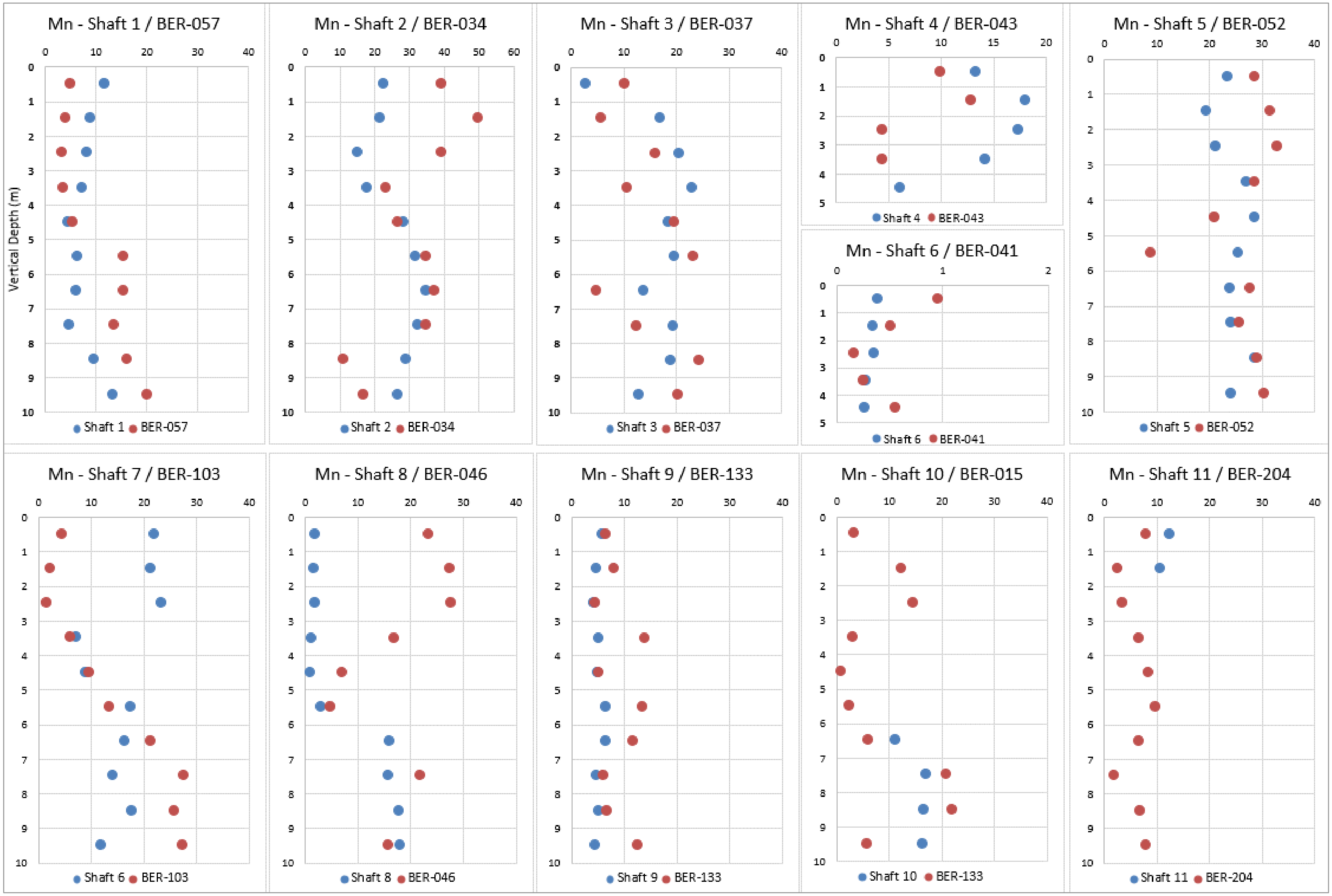
Source: Aftermath 2021.

Figure 9.10 Comparison of silver (g/t) for shaft sampling and RC drilling



Source: Aftermath from Silver Standard.

Figure 9.11 Comparison of manganese (%) for shaft sampling and RC drilling



Source: Aftermath from Silver Standard.

9.6 Exploration comments

As the manganese oxide mineralization is magnetic, ground magnetics readily maps the mineralization at surface and the geophysically modelled response to depth corresponds to the drilled mineralization. Similarly, the mineralization coincides with high chargeability anomalies, although less precisely. Chargeability at depth also broadly corresponds to the known mineralization.

Two exploration prospects have been identified outside of the historic Mineral Resource:

- Berenguela 2, with anomalous silver-copper-manganese, corresponding to the strike of the carbonates. There is however no ground magnetic response. The area is on the edge of the existing IP survey, which does show a chargeability high at this location. These results may indicate mineralization at depth.
- Berenguela West, with about 1 km strike of anomalous silver-copper-manganese mineralization, corresponding to the strike of the carbonates. This area is on the edge of a larger magnetic high, there is no IP survey over this target.

The two exploration prospects outside of the historic Mineral Resource area should be followed up. Aftermath should consider expanding the IP surveys to the west and east to the limits of the concessions as any mineralization will be present at depth. The two areas are outcropping. It is recommended that 3D geological interpretations of the strata are developed using the mapping data to guide any exploration drilling in these three areas.

10 Drilling

10.1 Introduction

This section describes the drilling conducted on the Property, including drillholes drilled for exploration and for resource development. In Section 10.3 under each program a discussion is given on the purpose of each program, the methods and procedures used. Despite this all being historical work, it is included here as this is the first Technical Report disclosed by the Issuer.

No drilling has been performed by Aftermath to date. Aftermath has compiled and checked original data from the programs from 2004 to 2019 as shown in Table 10.1, building a relational database in MS Access.

10.2 Drilling summary

Since 2004 a total of 323 diamond drillholes (DD) and RC holes totalling approximately 36,473 m in length have been drilled on the Property consisting of 32 DD and 291 RC holes. In addition, there was earlier drilling which is discussed in Section 10.3.1 but as there is no back-up data available at this time it is not included in Table 10.1. It is only included as historical information.

A summary of the drillholes from 2004 on is shown in Table 10.1.

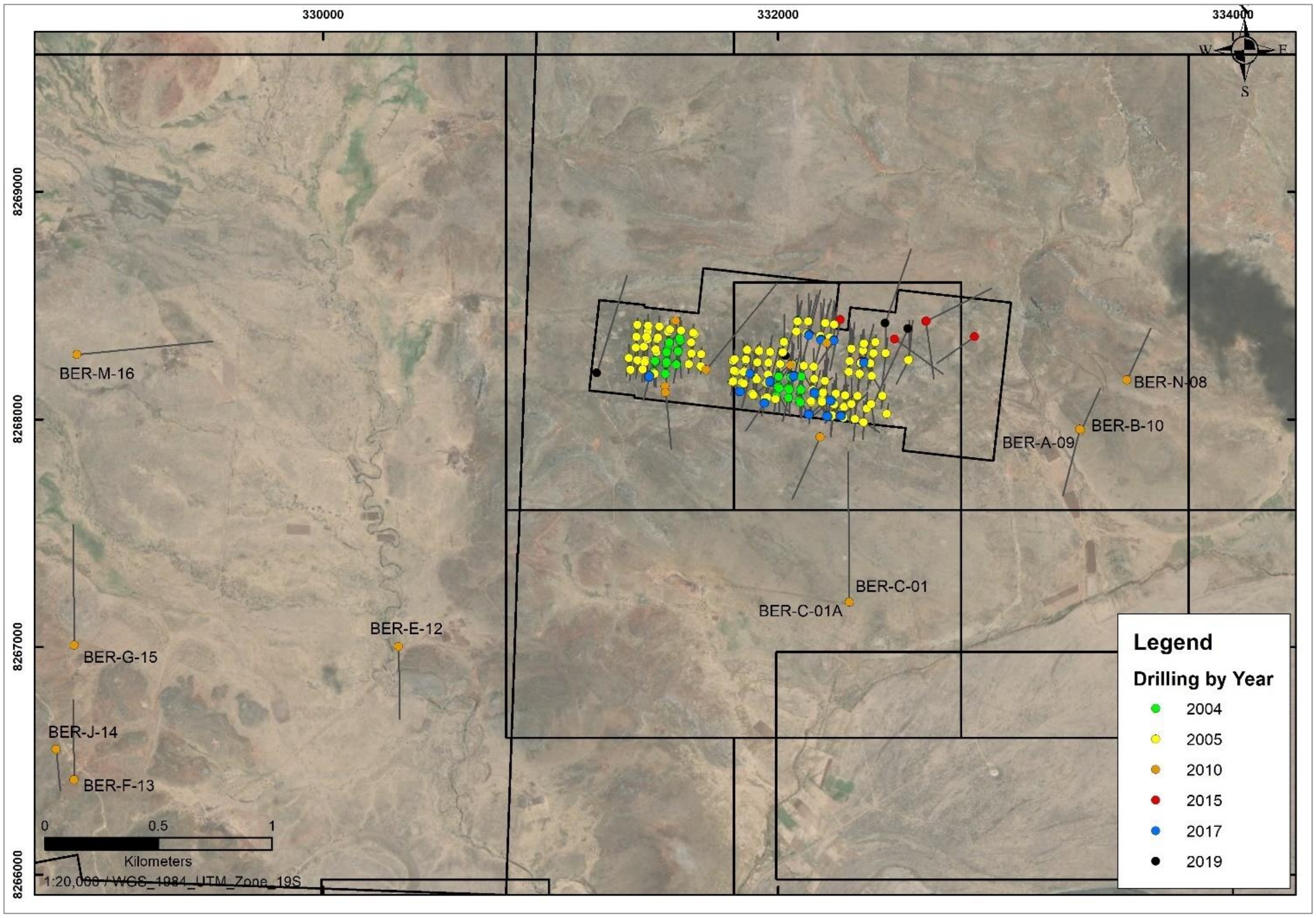
Table 10.1 Berenguela Property drilling summary

Year	Company name	Diamond core holes			Reverse circulation holes			Total meters	% of total metres
		Num.	Length (m)	Number of samples[1]	Num.	Length (m)	Number of samples[1]		
2004	Silver Standard	-	-	-	57	5,393	4,985	5,393	15
2005	Silver Standard	-	-	-	165	13,766	13,497	13,766	38
2010	Silver Standard	17	5,546.2	1,620	-	-	-	5,546.2	15
2015	Silver Standard	11	1,875.7	1,497	-	-	-	1,875.7	5
2017	Valor	-	-	-	69	8,465	8,325	8,465	23
2019	Rio Tinto	4	1,427.3	705	-	-	-	1,427.3	4
	Total	**32**	**8,849.2**	**3,822**	**291**	**27,624**	**26,807**	**36,473.2**	**100**

Note: [1]Excludes QA/QC samples.

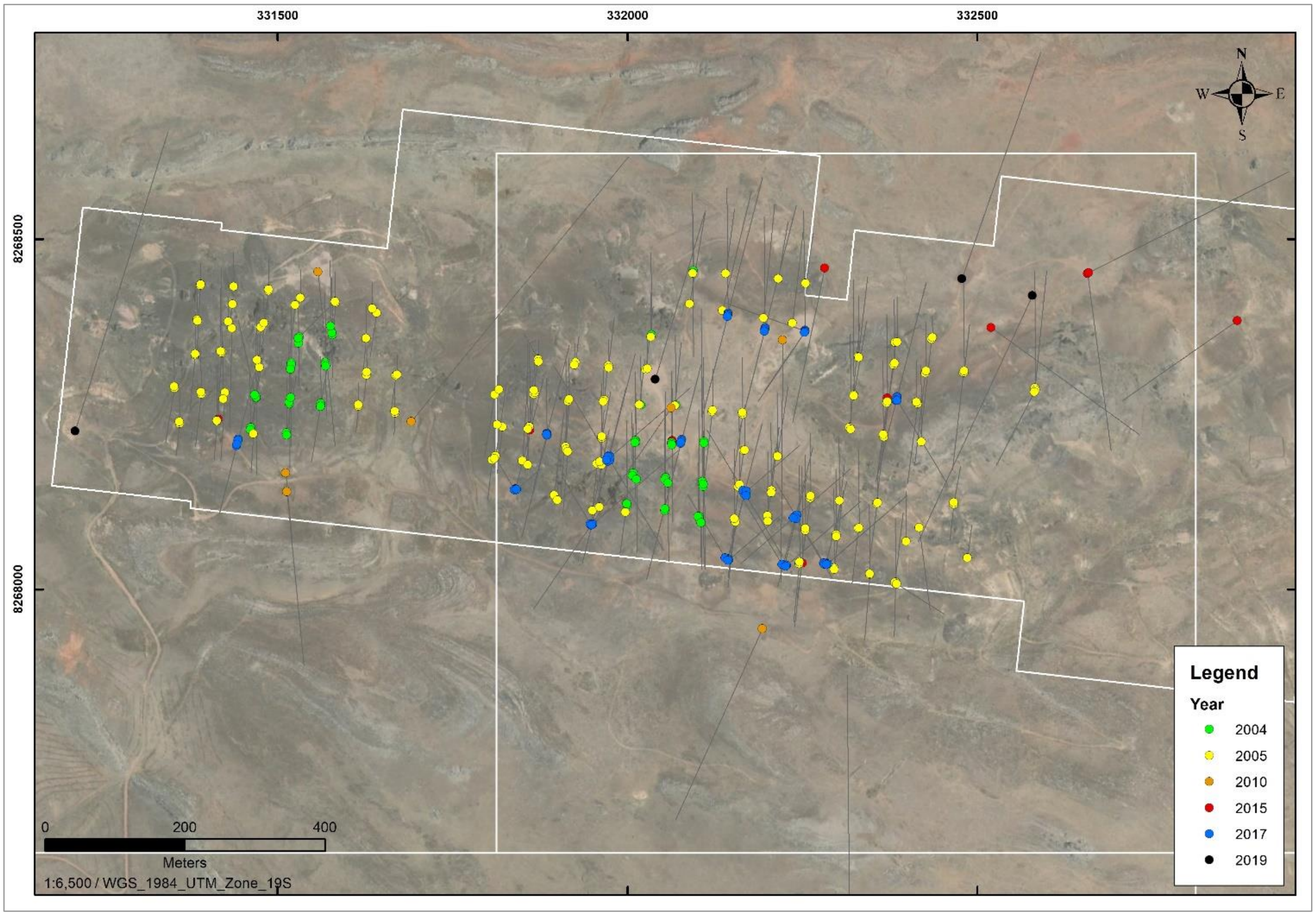
The location of these drillholes is shown by year drilled in Figure 10.1 in relation to the Property and in Figure 10.2 in and around the main area of mineralization, also by year drilled.

Figure 10.1 Location of drillholes on Property



Source: Aftermath 2021.

Figure 10.2 Location of drillholes at main mineralized area



Source: Aftermath 2021.

10.3 Drilling progress by year and operator

10.3.1 Pre-2004 drilling

Between September 1965 and 7 July 1966, ASARCO completed 52 diamond drillholes on a regularized 50 m grid. A total of 3,241.6 m was completed. Details of this program are provided in a final project report ASARCO provided to Lampa Mining upon the termination of the option agreement (Salazar 1967). This report includes hand-written logs and transcribed assay results, although in the available scan of the data it is often difficult to read.

Charter conducted 56 vertical holes on the 50 m grid established by ASARCO. Holes were collared using a rotary tricone and completed in with diamond drilling. A total of 3,386 m was drilled. This program is briefly described in the 1969 Historical Mineral Resource report by Strathern (1969), however, no original drill data referred to in the report is available.

The holes drilled by ASARCO and Charter do not form part of the current project database and have not been used in the historical resource estimates since 1970 because no raw data is available.

10.3.2 Silver Standard 2004-05

Silver Standard's first drilling programs occurred between November and December 2004, pausing for Christmas and New Year, and were completed between March and May 2005. The purpose of the programs was to define a Mineral Resource over the mineralization drilled by ASARCO and Charter Consolidated.

Details of the 2004 – 2005 program including interpreted cross sections are provided in Smith (2006). The period review of the Quality Control / Quality Assurance (QA/QC) for these programs is presented by McCrea (2005).

The programs were designed on a regular grid of nominally 50 m x 50 m. The 2004 program comprised 57 RC holes and the 2005 program included 165 RC holes. The 2004 and 2005 program included 95 vertical holes with an average depth of 78.0 m and 127 angled holes with an average downhole depth of 92.5 m.

There is no record of any downhole surveying on the angled holes. It has been assumed that the recorded bearings are the design grid bearings, as such no magnetic declination has been applied in the database. There are no photographs of the chips.

Smith (2006) described the RC drilling conditions as difficult to good. The former was due to clay zones. During the first 57 RC holes clay zones frequently caused reduced RC sample recovery or even lost intervals, with many intervals being flanked by mineralization. The clay blocking the face sampling hammer was alleviated by the use of water injection and additives. This is reported to have solved these issues but can have an effect of contaminating the samples. It is stated that there was a clear improvement in the reduction of unsampled RC intervals in the 2005 holes.

Eleven exploration shafts were mined by Silver Standard adjacent to vertical RC holes, see Section 9.5 for comparison of shaft sample results against the drill intersections.

10.3.3 Silver Standard 2010

The 2010 Silver Standard program was primarily designed as an exploration program consisting of 17 HQ size (96 mm) diamond core holes, including one redrill. A brief review of the 2010 program is provided by Soler and Burk (2012). The holes were designed to test several geophysical and geochemical targets. All holes intersected mineralization although at lower overall grades than the 2005 Mineral Resource estimate. These holes were the first holes to test deeper levels at Berenguela, helping to define the stratigraphy below the known carbonate units. Core recovery was not recorded.

Eleven of the holes were drilled outside of the deposit area, to the south and east. Six holes were drilled on the edge of the 2004 / 2005 drilling area exploring below the then known mineralization.

Average depth for the 2010 program was 326.25 m. Downhole surveys were performed at 50 m and 100 m, then every 100 m thereafter. The survey instrument type is not recorded. It has been assumed that it was a single shot digital tool. A magnetic declination to correct to grid north has been applied in the database.

Period digital photos of the core trays are available for eight of the nine diamond drillholes. The photos are considered to be of good quality.

10.3.4 Silver Standard 2015

Silver Standard's final program on the Property was in 2015 and consisted of 11 diamond core holes: five HQ size and six PQ size (122.6 mm), having core sizes of 63.5 mm and 85 mm, respectively. The main purpose of the program was to obtain metallurgical samples and in part replicate or twin vertical RC holes from the 2004 / 2005 program. Four holes were for exploration on the edge of the known extent of the deposit.

Within the known mineralization seven holes were drilled, including one redrill and average depth was 120 m. Another four holes were drilled on the north-east side of the known mineralized area. They expanded the mineralization to an average depth of 260 m.

Angled holes were downhole surveyed using Reflex EZ digital multishot tool, with surveys recorded every 25 m. Magnetic declination correction to grid north has been applied in the database.

Core recovery and RQD were recorded for the 2015 program. Values are reported in Bererra and Barboza (2016) however at this stage this dataset has not been incorporated into the Aftermath project database.

The 2015 program also incorporated the collection of bulk density data. Becerra and Barboza (2016) reported that 1,771 core samples were selected for bulk density determinations. The available Silver Standard data however totalled 1,716 samples of which 1,461 have bulk density determinations by the water displacement method, 175 samples measured only by weight and dimensions, 80 with no measurement. Silver Standard sent 58 samples to SGS Lima for independent verification.

High quality digital photos of the core trays are available for all of the 2015 program holes.

10.3.5 Valor 2017 program

Valor completed a total of 69 RC holes, with an average depth of 122.68 m. The program lasting 73 days, was intended to be an infill program and to expand the known mineralization. The intended spacing of the program was nominally 35 m including the previous drilling.

All but three holes, two vertical holes, and one angled hole, were downhole surveyed by true north seeking gyroscope. Surveys were recorded every 5 m downhole. A correction was applied in the database to record grid north.

Good quality digital photos of the RC chip trays are available for 59 of the 69 holes.

10.3.6 Rio Tinto 2019 program

In 2019 Rio Tinto drilled four relatively deep exploration holes, investigating possible feeder zones and different styles of mineralization at depth below the known mineralization.

The holes were surveyed using a multishot tool. The instrument type was not recorded. Magnetic declination correction to grid north has been applied in the database. Average core recovery for the 2019 program was 87.1%. RQD measurements were also collected.

High quality digital photos of the core trays are available.

10.4 Collar surveys and site inspection observations

A complete list of the collar details in the current Project database is given in Table 10.2. The datum used to record drill collars is PSAD56, zone 19 south.

Silver Standard originally contracted a local surveyor from Juliaca to survey the 2004 and 2005 drill collars. Later Silver Standard identified an error in this survey and later contracted PRW Survey company (PRW) from Lima to re-survey the collars (Smith 2014).

Due to drill pad rehabilitation not all the drill collars were visible in September 2012 and of the 222 holes drilled in 2004 - 2005 a total of 61 collars were available to be surveyed by PRW. This showed a consistent off set to the 2005 survey in the order of -60 m in easting, -9 m in northing and 2 m in elevation. Silver Standard adjusted the collar locations in the database for those not re-surveyed by adjusting them by the average difference of the closest 2012 surveyed collars. These are noted in Table 10.2 as "total stn.+Av.Offset".

There is no record of how the 17 holes drilled in 2010 were surveyed. Twelve (12) holes were re-surveyed by PRW and the differences between the original recorded collars and the PRW survey were variable between -5.25 and 11.39 m in easting and -2.92 and 7.41 m in northing. This suggests the original survey was undertaken using a hand-held GPS receiver.

The 11 holes drilled in 2015 collars were surveyed with differential GPS (DGPS); the survey contractor is not recorded.

All 49 holes drilled in 2017 were surveyed by Servicios Múltiples Cáceres S.R.L. using DGPS.

In 2019 Rio Tinto recorded that three of the four holes were surveyed by DGPS and one by GPS. The surveying contractor is not recorded.

The location of a selection of these collars were verified by QP Mr Batelochi during the December 2020 site inspection and made the following observations:

- 47 collars were visited in the field with visible collar labels; approximately 15% of the database.
- The collars positions were verified with a hand-held GPS receiver. The average horizontal difference between to the measured location and the database collar was 8.3 m. A distance considered acceptable given the accuracy of hand-held GPS receivers.
- Additional collars were visited; however, their labels are not visible or have been removed as part of drill pad rehabilitation.

The findings of the site inspection are further discussed in Section 12.1.

Table 10.2 Berenguela Project drill collar summary

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2004	RC	BER-008	332302.69	8268519.21	4249.44	total stn.+Av.Offset	250.00	-90	0
2004	RC	BER-009	332303.03	8268521.99	4249.46	total stn.+Av.Offset	149.00	-45	0
2004	RC	BER-010	332303.89	8268515.04	4249.61	DGPS	115.00	-45	180
2004	RC	BER-011	332304.28	8268518.05	4249.57	DGPS	76.00	-90	0
2004	RC	BER-012	332296.46	8268472.01	4242.54	DGPS	77.00	-45	0
2004	RC	BER-013	332301.05	8268463.32	4242.55	DGPS	67.00	-45	180
2004	RC	BER-014	332250.21	8268527.67	4246.70	DGPS	123.00	-45	0
2004	RC	BER-015	332249.25	8268524.74	4246.61	total stn.+Av.Offset	100.00	-90	0
2004	RC	BER-016	332253.45	8268519.94	4246.40	total stn.+Av.Offset	112.00	-45	180
2004	RC	BER-001	332195.33	8268488.09	4238.89	total stn.+Av.Offset	76.00	-90	0
2004	RC	BER-002	332194.73	8268490.29	4239.12	total stn.+Av.Offset	119.00	-45	0
2004	RC	BER-003	332248.92	8268480.79	4239.45	DGPS	101.00	-90	0
2004	RC	BER-004	332249.26	8268483.22	4239.53	DGPS	135.00	-45	0
2004	RC	BER-005	332298.22	8268471.81	4242.52	DGPS	152.00	-45	0
2004	RC	BER-006	332297.76	8268469.28	4242.53	DGPS	101.00	-90	0
2004	RC	BER-007	332300.00	8268464.54	4242.47	DGPS	50.00	-45	180
2004	RC	BER-017	332203.95	8268533.84	4247.07	DGPS	70.00	-45	0
2004	RC	BER-018	332202.55	8268530.64	4246.99	DGPS	90.00	-90	0
2004	RC	BER-019	332208.35	8268525.04	4246.57	DGPS	104.00	-45	180
2004	RC	BER-020	332207.09	8268580.41	4251.92	DGPS	98.00	-45	0
2004	RC	BER-021	332207.49	8268578.32	4251.83	DGPS	70.00	-90	0
2004	RC	BER-022	332206.30	8268577.42	4251.94	DGPS	80.00	-45	180
2004	RC	BER-023	332258.89	8268577.99	4251.22	total stn.+Av.Offset	91.00	-45	0
2004	RC	BER-024	332258.89	8268575.79	4251.02	total stn.+Av.Offset	100.00	-90	0
2004	RC	BER-025	332258.99	8268574.49	4251.12	total stn.+Av.Offset	110.00	-45	180
2004	RC	BER-026	332304.79	8268579.19	4252.19	total stn.+Av.Offset	120.00	-90	0
2004	RC	BER-027	332304.89	8268576.79	4252.15	total stn.+Av.Offset	180.00	-45	180
2004	RC	BER-028	332264.49	8268631.19	4253.32	total stn.+Av.Offset	100.00	-90	0
2004	RC	BER-029	332214.69	8268631.09	4251.89	total stn.+Av.Offset	70.00	-90	0
2004	RC	BER-030	332229.79	8268731.79	4251.19	total stn.+Av.Offset	117.00	-45	0
2004	RC	BER-031	332289.89	8268823.39	4256.16	total stn.+Av.Offset	81.00	-45	0
2004	RC	BER-032	332288.79	8268820.49	4256.15	total stn.+Av.Offset	120.00	-45	180
2004	RC	BER-033	331664.83	8268641.50	4199.22	DGPS	110.00	-45	180
2004	RC	BER-034	331664.55	8268642.61	4199.19	DGPS	91.00	-90	0
2004	RC	BER-035	331662.42	8268645.70	4199.03	total stn.+Av.Offset	110.00	-55	348
2004	RC	BER-036	331715.12	8268690.96	4208.60	DGPS	84.00	-45	0
2004	RC	BER-037	331715.20	8268688.84	4208.38	DGPS	52.00	-90	0
2004	RC	BER-038	331713.64	8268682.51	4208.26	total stn.+Av.Offset	110.00	-45	180
2004	RC	BER-039	331725.36	8268719.59	4211.51	DGPS	61.00	-45	180
2004	RC	BER-040	331726.07	8268728.45	4211.36	DGPS	70.00	-45	45
2004	RC	BER-041	331724.97	8268726.82	4211.33	total stn.+Av.Offset	60.00	-90	0
2004	RC	BER-042	331711.97	8268632.82	4214.70	total stn.+Av.Offset	91.00	-45	180
2004	RC	BER-043	331711.87	8268634.92	4214.65	total stn.+Av.Offset	90.00	-90	0
2004	RC	BER-044	331714.07	8268642.12	4214.50	total stn.+Av.Offset	55.00	-50	0

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2004	RC	BER-045	331773.49	8268731.81	4221.08	DGPS	61.00	-45	180
2004	RC	BER-046	331773.35	8268734.30	4221.08	DGPS	79.00	-90	0
2004	RC	BER-047	331771.21	8268743.97	4221.44	total stn.+Av.Offset	94.00	-45	0
2004	RC	BER-048	331763.61	8268692.27	4217.89	total stn.+Av.Offset	100.00	-45	0
2004	RC	BER-049	331763.61	8268689.77	4217.85	total stn.+Av.Offset	37.00	-90	0
2004	RC	BER-050	331764.01	8268686.97	4217.79	total stn.+Av.Offset	70.00	-45	180
2004	RC	BER-051	331757.31	8268633.77	4218.07	total stn.+Av.Offset	70.00	-45	10
2004	RC	BER-052	331757.21	8268630.97	4218.08	total stn.+Av.Offset	70.00	-90	0
2004	RC	BER-053	331756.61	8268629.07	4218.06	total stn.+Av.Offset	80.00	-45	190
2004	RC	BER-054	331707.88	8268591.54	4212.63	DGPS	81.00	-45	10
2004	RC	BER-055	331708.50	8268588.19	4212.33	DGPS	80.00	-90	0
2004	RC	BER-056	331657.01	8268598.94	4205.66	DGPS	103.00	-45	10
2004	RC	BER-057	331656.23	8268595.76	4205.56	DGPS	80.00	-90	0
2005	RC	BER-058	331547.90	8268655.29	4165.99	total stn.+Av.Offset	78.00	-45	190
2005	RC	BER-059	331547.40	8268657.59	4165.61	total stn.+Av.Offset	60.00	-90	0
2005	RC	BER-060	331577.50	8268702.99	4169.72	total stn.+Av.Offset	80.00	-45	186
2005	RC	BER-061	331577.50	8268704.49	4169.74	total stn.+Av.Offset	60.00	-90	0
2005	RC	BER-062	331580.60	8268753.59	4168.73	total stn.+Av.Offset	52.00	-90	0
2005	RC	BER-063	331581.00	8268751.39	4168.91	total stn.+Av.Offset	52.00	-45	181
2005	RC	BER-064	331585.00	8268802.29	4165.99	total stn.+Av.Offset	49.00	-45	184
2005	RC	BER-065	331585.27	8268804.01	4166.10	DGPS	29.00	-90	0
2005	RC	BER-066	331630.69	8268775.57	4166.92	total stn.+Av.Offset	25.00	-45	189
2005	RC	BER-067	331615.59	8268706.17	4170.39	total stn.+Av.Offset	85.00	-45	185
2005	RC	BER-068	331615.69	8268707.77	4170.35	total stn.+Av.Offset	118.00	-90	0
2005	RC	BER-069	331629.99	8268741.07	4181.22	total stn.+Av.Offset	142.00	-45	182
2005	RC	BER-070	331624.49	8268750.57	4180.41	total stn.+Av.Offset	34.00	-90	0
2005	RC	BER-071	331669.39	8268685.07	4191.57	total stn.+Av.Offset	100.00	-45	187
2005	RC	BER-072	331665.89	8268695.87	4192.30	total stn.+Av.Offset	70.00	-90	0
2005	RC	BER-073	331586.19	8268646.97	4181.68	total stn.+Av.Offset	76.00	-45	187
2005	RC	BER-074	331585.69	8268649.67	4181.66	total stn.+Av.Offset	60.00	-90	0
2005	RC	BER-075	331555.09	8268604.87	4175.92	total stn.+Av.Offset	46.00	-45	187
2005	RC	BER-076	331554.99	8268607.27	4175.66	total stn.+Av.Offset	49.00	-90	0
2005	RC	BER-077	331671.29	8268742.37	4191.10	total stn.+Av.Offset	79.00	-45	185
2005	RC	BER-078	331675.79	8268748.67	4190.58	total stn.+Av.Offset	40.00	-90	0
2005	RC	BER-079	331608.59	8268608.27	4195.69	total stn.+Av.Offset	55.00	-45	185
2005	RC	BER-080	331619.89	8268649.17	4193.94	total stn.+Av.Offset	97.00	-45	184
2005	RC	BER-081	331617.49	8268640.07	4194.21	total stn.+Av.Offset	82.00	-90	0
2005	RC	BER-082	331608.39	8268609.07	4195.62	total stn.+Av.Offset	79.00	-90	0
2005	RC	BER-083	331660.49	8268589.87	4205.78	total stn.+Av.Offset	55.00	-45	184
2005	RC	BER-084	331632.49	8268800.37	4184.08	total stn.+Av.Offset	49.00	-90	0
2005	RC	BER-085	331822.09	8268726.07	4214.78	total stn.+Av.Offset	55.00	-45	186
2005	RC	BER-086	331822.09	8268726.67	4214.71	total stn.+Av.Offset	49.00	-90	0
2005	RC	BER-087	331864.67	8268673.41	4210.79	DGPS	46.00	-45	189
2005	RC	BER-088	331865.97	8268674.53	4210.89	DGPS	29.00	-90	0
2005	RC	BER-089	331822.40	8268674.39	4214.97	DGPS	37.00	-45	187

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2005	RC	BER-090	331822.73	8268678.42	4215.01	DGPS	34.00	-90	0
2005	RC	BER-091	331810.78	8268629.58	4209.06	total stn.+Av.Offset	37.00	-45	186
2005	RC	BER-092	331810.84	8268631.64	4209.10	DGPS	31.00	-90	0
2005	RC	BER-093	331863.15	8268619.63	4206.99	total stn.+Av.Offset	31.00	-45	183
2005	RC	BER-094	331862.97	8268622.13	4206.93	DGPS	34.00	-90	0
2005	RC	BER-095	331682.38	8268794.49	4194.58	total stn.+Av.Offset	67.00	-45	188
2005	RC	BER-096	331682.48	8268796.49	4194.33	total stn.+Av.Offset	46.00	-90	0
2005	RC	BER-097	331778.08	8268777.69	4213.18	total stn.+Av.Offset	90.00	-45	185
2005	RC	BER-098	331777.38	8268779.09	4212.82	total stn.+Av.Offset	43.00	-90	0
2005	RC	BER-099	331836.88	8268762.99	4212.23	total stn.+Av.Offset	64.00	-45	189
2005	RC	BER-100	331830.68	8268769.19	4211.80	total stn.+Av.Offset	37.00	-90	0
2005	RC	BER-101	332002.08	8268552.89	4233.89	total stn.+Av.Offset	58.00	-45	187
2005	RC	BER-102	332006.78	8268558.49	4234.07	total stn.+Av.Offset	107.00	-45	9
2005	RC	BER-103	332005.18	8268554.99	4233.96	total stn.+Av.Offset	44.00	-90	0
2005	RC	BER-104	332045.43	8268551.52	4238.72	DGPS	103.00	-45	4
2005	RC	BER-105	332053.19	8268545.89	4238.63	DGPS	52.00	-90	0
2005	RC	BER-106	332090.63	8268502.59	4234.74	total stn.+Av.Offset	118.00	-45	7
2005	RC	BER-107	332095.13	8268495.29	4234.49	total stn.+Av.Offset	49.00	-90	0
2005	RC	BER-108	332145.63	8268480.59	4234.78	total stn.+Av.Offset	118.00	-45	12
2005	RC	BER-109	332155.73	8268485.69	4235.18	total stn.+Av.Offset	54.00	-90	0
2005	RC	BER-110	332192.63	8268478.29	4239.14	total stn.+Av.Offset	58.00	-45	188
2005	RC	BER-111	332005.78	8268646.14	4242.88	DGPS	91.00	-45	190
2005	RC	BER-112	332011.77	8268653.50	4242.70	DGPS	40.00	-90	0
2005	RC	BER-113	332016.69	8268600.09	4245.75	DGPS	67.00	-45	187
2005	RC	BER-114	332009.52	8268603.10	4245.51	total stn.+Av.Offset	70.00	-90	0
2005	RC	BER-115	332061.72	8268646.70	4252.85	total stn.+Av.Offset	112.00	-45	187
2005	RC	BER-116	332063.22	8268649.10	4252.73	total stn.+Av.Offset	53.00	-90	0
2005	RC	BER-117	332055.17	8268600.46	4250.73	DGPS	70.00	-45	5
2005	RC	BER-118	332053.07	8268596.95	4249.87	total stn.+Av.Offset	120.00	-90	0
2005	RC	BER-119	332107.07	8268571.75	4249.63	total stn.+Av.Offset	64.00	-45	5
2005	RC	BER-120	332108.07	8268567.95	4249.02	total stn.+Av.Offset	126.00	-90	0
2005	RC	BER-121	332109.97	8268564.65	4248.61	total stn.+Av.Offset	88.00	-45	185
2005	RC	BER-122	332110.57	8268636.65	4255.85	total stn.+Av.Offset	144.00	-45	185
2005	RC	BER-123	332112.07	8268639.75	4255.67	total stn.+Av.Offset	58.00	-90	0
2005	RC	BER-124	332151.97	8268547.45	4247.47	total stn.+Av.Offset	94.00	-45	186
2005	RC	BER-125	332158.27	8268545.85	4247.22	total stn.+Av.Offset	106.00	-90	0
2005	RC	BER-126	332156.07	8268550.55	4247.64	total stn.+Av.Offset	73.00	-45	5
2005	RC	BER-127	332158.97	8268583.95	4250.61	total stn.+Av.Offset	67.00	-45	11
2005	RC	BER-128	332158.97	8268586.35	4250.66	total stn.+Av.Offset	76.00	-90	0
2005	RC	BER-129	332061.87	8268652.45	4252.30	total stn.+Av.Offset	55.00	-45	7
2005	RC	BER-130	332162.27	8268638.85	4249.96	total stn.+Av.Offset	46.00	-45	6
2005	RC	BER-131	332160.87	8268636.05	4249.87	total stn.+Av.Offset	45.00	-90	0
2005	RC	BER-132	332121.37	8268692.35	4242.39	total stn.+Av.Offset	37.00	-45	7
2005	RC	BER-133	332119.67	8268688.85	4242.31	total stn.+Av.Offset	30.00	-90	0
2005	RC	BER-134	332168.47	8268687.35	4245.86	total stn.+Av.Offset	70.00	-44	7

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2005	RC	BER-135	332168.77	8268684.55	4245.92	total stn.+Av.Offset	40.00	-90	0
2005	RC	BER-136	332212.47	8268631.65	4251.58	total stn.+Av.Offset	64.00	-45	7
2005	RC	BER-137	332221.57	8268682.25	4249.75	total stn.+Av.Offset	90.00	-46	7
2005	RC	BER-138	332223.87	8268683.35	4249.77	total stn.+Av.Offset	49.00	-90	0
2005	RC	BER-139	332229.17	8268728.75	4250.88	total stn.+Av.Offset	61.00	-90	0
2005	RC	BER-140	332263.37	8268630.65	4253.01	total stn.+Av.Offset	90.00	-45	6
2005	RC	BER-141	332316.67	8268621.95	4253.18	total stn.+Av.Offset	101.00	-45	187
2005	RC	BER-142	331613.77	8268708.25	4170.20	total stn.+Av.Offset	90.00	-90	0
2005	RC	BER-143	332317.47	8268623.85	4253.26	total stn.+Av.Offset	59.00	-90	0
2005	RC	BER-144	332360.47	8268617.95	4251.98	total stn.+Av.Offset	94.00	-45	189
2005	RC	BER-145	332360.07	8268620.55	4251.69	total stn.+Av.Offset	79.00	-90	0
2005	RC	BER-146	332361.47	8268566.45	4251.09	total stn.+Av.Offset	127.00	-45	188
2005	RC	BER-147	332067.87	8268696.35	4241.21	total stn.+Av.Offset	43.00	-45	331
2005	RC	BER-148	332068.57	8268693.25	4241.31	total stn.+Av.Offset	31.00	-90	0
2005	RC	BER-149	332363.17	8268566.85	4250.81	total stn.+Av.Offset	64.00	-90	0
2005	RC	BER-150	332354.27	8268514.65	4255.18	total stn.+Av.Offset	131.00	-45	187
2005	RC	BER-151	332355.87	8268517.85	4254.57	total stn.+Av.Offset	100.00	-90	0
2005	RC	BER-152	331720.57	8268774.25	4207.68	total stn.+Av.Offset	70.00	-45	187
2005	RC	BER-153	331727.97	8268784.55	4206.78	total stn.+Av.Offset	40.00	-90	0
2005	RC	BER-154	332349.77	8268463.95	4249.59	total stn.+Av.Offset	94.00	-45	187
2005	RC	BER-155	332348.47	8268468.85	4249.46	total stn.+Av.Offset	100.00	-90	0
2005	RC	BER-156	332395.77	8268473.15	4255.42	total stn.+Av.Offset	98.00	-45	7
2005	RC	BER-157	332396.37	8268465.25	4254.96	total stn.+Av.Offset	99.00	-90	0
2005	RC	BER-158	332409.87	8268558.55	4245.65	total stn.+Av.Offset	99.00	-45	9
2005	RC	BER-159	332401.57	8268509.45	4253.88	total stn.+Av.Offset	91.00	-45	7
2005	RC	BER-160	332401.09	8268506.16	4253.86	total stn.+Av.Offset	99.00	-90	0
2005	RC	BER-161	332410.07	8268557.75	4245.59	total stn.+Av.Offset	91.00	-90	0
2005	RC	BER-162	332456.91	8268498.49	4247.59	DGPS	145.00	-45	188
2005	RC	BER-163	332457.25	8268501.38	4247.47	DGPS	90.00	-90	0
2005	RC	BER-164	332450.02	8268451.93	4254.85	DGPS	139.00	-45	187
2005	RC	BER-165	332449.69	8268454.96	4253.96	total stn.+Av.Offset	105.00	-90	0
2005	RC	BER-166	332493.99	8268446.26	4248.52	total stn.+Av.Offset	99.00	-45	7
2005	RC	BER-167	332494.01	8268443.62	4249.42	DGPS	96.00	-90	0
2005	RC	BER-168	332441.10	8268404.75	4242.83	DGPS	84.00	-44	186
2005	RC	BER-169	332441.77	8268407.00	4242.91	DGPS	138.00	-90	0
2005	RC	BER-170	332541.88	8268388.80	4238.22	DGPS	93.00	-45	185
2005	RC	BER-171	332541.84	8268390.34	4238.25	DGPS	99.00	-90	0
2005	RC	BER-172	332498.45	8268494.53	4235.69	total stn.+Av.Offset	90.00	-90	0
2005	RC	BER-173	332525.45	8268455.03	4237.17	total stn.+Av.Offset	80.00	-45	187
2005	RC	BER-174	332526.85	8268455.73	4237.18	total stn.+Av.Offset	112.00	-90	0
2005	RC	BER-175	332491.15	8268398.45	4242.96	DGPS	112.00	-44	7
2005	RC	BER-176	332491.11	8268396.23	4242.76	DGPS	114.00	-90	0
2005	RC	BER-177	332578.95	8268378.11	4229.24	total stn.+Av.Offset	91.00	-90	0
2005	RC	BER-178	332578.65	8268376.01	4229.02	total stn.+Av.Offset	75.00	-45	182
2005	RC	BER-179	332577.85	8268377.91	4229.15	total stn.+Av.Offset	100.00	-45	7

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2005	RC	BER-180	332580.15	8268375.81	4229.08	total stn.+Av.Offset	81.00	-45	123
2005	RC	BER-181	332593.95	8268436.21	4220.73	total stn.+Av.Offset	72.00	-90	0
2005	RC	BER-182	332612.65	8268456.41	4208.05	total stn.+Av.Offset	118.00	-46	173
2005	RC	BER-183	332552.15	8268490.61	4217.51	total stn.+Av.Offset	85.00	-45	188
2005	RC	BER-184	332553.05	8268491.81	4217.48	total stn.+Av.Offset	48.00	-90	0
2005	RC	BER-185	332562.15	8268585.79	4239.10	DGPS	84.00	-45	187
2005	RC	BER-186	332561.50	8268588.98	4239.23	DGPS	106.00	-90	0
2005	RC	BER-187	332519.45	8268645.72	4242.77	total stn.+Av.Offset	106.00	-44	10
2005	RC	BER-188	332519.15	8268644.62	4242.71	total stn.+Av.Offset	166.00	-90	0
2005	RC	BER-189	332525.55	8268700.22	4241.24	total stn.+Av.Offset	115.00	-45	7
2005	RC	BER-190	332526.15	8268699.42	4241.17	total stn.+Av.Offset	88.00	-90	0
2005	RC	BER-191	332513.06	8268599.14	4241.90	DGPS	149.00	-44	6
2005	RC	BER-192	332514.71	8268596.67	4241.53	total stn.+Av.Offset	136.00	-90	0
2005	RC	BER-193	332566.41	8268634.27	4234.26	total stn.+Av.Offset	109.00	-45	188
2005	RC	BER-194	332567.31	8268636.36	4234.21	DGPS	120.00	-90	0
2005	RC	BER-195	332576.34	8268688.69	4229.24	total stn.+Av.Offset	145.00	-46	189
2005	RC	BER-196	332577.34	8268691.09	4229.19	total stn.+Av.Offset	91.00	-90	0
2005	RC	BER-197	332578.24	8268720.79	4224.68	total stn.+Av.Offset	166.00	-45	187
2005	RC	BER-198	332581.34	8268721.19	4224.44	total stn.+Av.Offset	64.00	-90	0
2005	RC	BER-199	332630.24	8268725.39	4217.07	total stn.+Av.Offset	136.00	-45	187
2005	RC	BER-200	332631.54	8268727.99	4216.89	total stn.+Av.Offset	30.00	-90	0
2005	RC	BER-201	332621.31	8268677.15	4224.52	DGPS	133.00	-47	187
2005	RC	BER-202	332622.47	8268679.92	4224.21	total stn.+Av.Offset	70.00	-90	0
2005	RC	BER-203	332610.67	8268633.22	4229.89	total stn.+Av.Offset	115.00	-47	188
2005	RC	BER-204	332608.77	8268635.52	4229.83	total stn.+Av.Offset	60.00	-90	0
2005	RC	BER-205	332675.87	8268677.36	4217.33	DGPS	140.00	-45	187
2005	RC	BER-206	332676.77	8268678.02	4217.26	total stn.+Av.Offset	127.00	-90	0
2005	RC	BER-207	332676.77	8268679.92	4217.30	total stn.+Av.Offset	67.00	-43	7
2005	RC	BER-208	332615.83	8268578.96	4237.43	DGPS	109.00	-90	0
2005	RC	BER-209	332431.29	8268748.59	4245.68	total stn.+Av.Offset	136.00	-44	7
2005	RC	BER-210	332389.89	8268755.49	4253.28	total stn.+Av.Offset	163.00	-45	6
2005	RC	BER-211	332450.19	8268805.19	4240.38	total stn.+Av.Offset	73.00	-44	9
2005	RC	BER-212	332411.19	8268811.79	4252.41	total stn.+Av.Offset	82.00	-44	10
2005	RC	BER-213	332331.39	8268766.49	4259.84	total stn.+Av.Offset	174.00	-45	14
2005	RC	BER-214	332335.89	8268819.19	4260.94	total stn.+Av.Offset	93.00	-45	8
2005	RC	BER-215	332284.39	8268775.59	4256.86	total stn.+Av.Offset	136.00	-45	10
2005	RC	BER-216	332681.39	8268412.69	4175.47	total stn.+Av.Offset	48.00	-46	8
2005	RC	BER-217	332662.21	8268489.76	4175.05	DGPS	52.00	-45	187
2005	RC	BER-218	332288.80	8268819.43	4255.35	total stn.+Av.Offset	115.00	-90	0
2005	RC	BER-219	332778.30	8268655.73	4195.74	total stn.+Av.Offset	168.00	-45	6
2005	RC	BER-220	332778.90	8268652.93	4195.86	total stn.+Av.Offset	170.00	-90	0
2005	RC	BER-221	332777.21	8268649.83	4195.89	DGPS	118.00	-43	208
2005	RC	BER-222	332662.19	8268492.19	4175.13	DGPS	52.00	-45	11
2010	DD	BER-A-09	333536.30	8268342.52	4044.67	DGPS	200.20	-50	24.84
2010	DD	BER-B-10	333530.11	8268345.95	4043.57	DGPS	300.00	-52.40	196.34

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2010	DD	BER-C-01	332515.92	8267585.72	4079.94	likely GPS	660.20	-81.90	339.04
2010	DD	BER-C-01A	332515.92	8267586.72	4079.94	likely GPS	75.40	-80.00	359.85
2010	DD	BER-D-03	332417.46	8268724.30	4249.07	likely GPS	346.20	-54.80	176.64
2010	DD	BER-E-12	330535.24	8267390.93	4020.24	DGPS	318.00	-50.00	179.84
2010	DD	BER-F-13	329107.06	8266806.70	4147.32	DGPS	350.00	-51.90	350.84
2010	DD	BER-G-15	329108.43	8267396.60	4076.46	DGPS	528.60	-61.20	352.84
2010	DD	BER-H-07	331752.96	8268821.66	4194.01	DGPS	250.00	-50.00	174.84
2010	DD	BER-I-11	331706.57	8268534.15	4201.57	likely GPS	100.00	-50.00	174.84
2010	DD	BER-J-14	329029.46	8266939.37	4146.65	DGPS	180.10	-50.00	174.84
2010	DD	BER-K-05	332388.27	8268311.78	4233.80	DGPS	300.00	-50.00	204.84
2010	DD	BER-L-02	331886.16	8268607.88	4207.59	likely GPS	488.90	-50.00	39.84
2010		BER-M-16	329120.07	8268673.41	4106.73	DGPS	600.00	-89.40	78.74
2010	DD	BER-N-08	333737.19	8268561.24	4154.10	DGPS	250.00	-50.00	24.84
2010	DD	BER-O-04	332257.79	8268627.35	4253.81	DGPS	348.40	-51.60	212.44
2010	DD	BER-P-06	331708.45	8268507.34	4202.11	DGPS	250.20	-50.00	174.84
2015	DD	BED-001	331610.54	8268610.94	4197.20	DGPS	79.00	-90.00	0.00
2015	DD	BED-002	332056.01	8268595.56	4250.30	DGPS	120.00	-90.00	0.00
2015	DD	BED-003	332259.47	8268580.53	4251.70	DGPS	100.00	-90.00	0.00
2015	DD	BED-003A	332259.40	8268580.50	4251.70	DGPS	55.00	-90.00	0.00
2015	DD	BED-004	332445.75	8268405.26	4243.39	DGPS	138.00	-90.00	0.00
2015	DD	BED-005	332566.94	8268641.30	4234.54	DGPS	120.00	-90.00	0.00
2015	DD	BED-006	332715.40	8268742.05	4202.98	DGPS	261.70	-46.10	126.30
2015	DD	BED-007	332853.45	8268819.31	4195.28	DGPS	255.00	-47.60	172.80
2015	DD	BED-008	333067.55	8268751.77	4114.00	DGPS	201.20	-46.30	233.80
2015	DD	BED-009	332477.49	8268826.99	4233.07	DGPS	225.80	-44.80	191.90
2015	DD	BED-010	332854.96	8268820.24	4195.13	DGPS	320.00	-45.70	63.10
2017	RC	BER223-17	332339.41	8268762.63	4260.65	DGPS	200.00	-61.08	14.85
2017	RC	BER225-17	332338.78	8268759.21	4260.57	DGPS	150.00	-69.29	192.11
2017	RC	BER226-17	332338.46	8268757.50	4260.50	DGPS	110.00	-52.16	193.78
2017	RC	BER227-17	332392.65	8268742.00	4254.98	DGPS	180.00	-56.77	15.02
2017	RC	BER229-17	332391.65	8268738.24	4254.95	DGPS	150.00	-70.91	189.98
2017	RC	BER230-17	332391.20	8268736.59	4254.92	DGPS	100.00	-49.53	195.18
2017	RC	BER231-17	332449.56	8268738.38	4246.69	DGPS	170.00	-57.71	359.42
2017	RC	BER232-17	332449.46	8268737.18	4246.71	DGPS	120.00	-61.97	287.54
2017	RC	BER233-17	332449.46	8268736.08	4246.70	DGPS	120.00	-70.63	214.82
2017	RC	BER235-17	332080.46	8268590.96	4250.51	DGPS	130.00	-68.46	6.49
2017	RC	BER236-17	332080.61	8268587.75	4250.55	DGPS	150.00	-52.71	200.23
2017	RC	BER237-17	332339.42	8268411.70	4234.64	DGPS	100.00	-47.48	12.60
2017	RC	BER238-17	332339.02	8268410.44	4234.53	DGPS	100.00	-60.21	14.98
2017	RC	BER239-17	332335.05	8268412.86	4234.61	DGPS	105.00	-47.23	325.53
2017	RC	BER240-17	332340.63	8268410.14	4234.62	DGPS	100.00	-47.83	49.54
2017	RC	BER241-17	332339.19	8268409.00	4234.63	DGPS	100.00	-66.00	52.30
2017	RC	BER242-17	332169.77	8268559.00	4249.48	DGPS	150.00	-60.99	8.09
2017	RC	BER243-17	332167.54	8268550.81	4249.25	DGPS	150.00	-43.77	191.16
2017	RC	BER244-17	332170.44	8268552.37	4249.23	DGPS	150.00	-47.53	150.84

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2017	RC	BER245-17	332170.78	8268557.07	4249.44	DGPS	150.00	-59.84	50.75
2017	RC	BER246-17	332167.70	8268557.34	4249.46	DGPS	150.00	-66.81	326.57
2017	RC	BER247-17	332273.34	8268582.06	4251.94	DGPS	110.00	-53.15	9.43
2017	RC	BER248-17	332272.91	8268580.54	4251.95	DGPS	100.00	-69.14	18.09
2017	RC	BER249-17	332271.67	8268576.17	4251.72	DGPS	200.00	-57.15	196.72
2017	RC	BER250-17	332272.15	8268577.92	4251.85	DGPS	140.00	-68.23	194.10
2017	RC	BER251-17	332581.21	8268643.31	4234.76	DGPS	140.00	-59.57	14.94
2017	RC	BER252-17	332580.78	8268641.89	4234.80	DGPS	170.00	-75.21	19.74
2017	RC	BER253-17	332579.53	8268637.30	4234.69	DGPS	110.00	-55.49	191.56
2017	RC	BER254-17	332579.90	8268638.75	4234.78	DGPS	120.00	-73.64	185.13
2017	RC	BER255-17	332362.94	8268506.69	4255.17	DGPS	100.00	-65.35	14.16
2017	RC	BER256-17	332362.29	8268504.48	4255.28	DGPS	100.00	-64.75	193.85
2017	RC	BER257-17	332360.52	8268509.53	4255.16	DGPS	100.00	-45.30	329.16
2017	RC	BER258-17	332365.52	8268508.09	4255.21	DGPS	100.00	-45.51	48.79
2017	RC	BER259-17	332365.16	8268501.64	4255.39	DGPS	100.00	-44.95	149.58
2017	RC	BER260-17	332435.72	8268473.32	4256.94	DGPS	100.00	-64.59	17.98
2017	RC	BER261-17	332434.60	8268469.56	4256.92	DGPS	100.00	-63.55	194.12
2017	RC	BER262-17	332437.95	8268474.17	4256.91	DGPS	100.00	-45.32	48.93
2017	RC	BER263-17	332437.25	8268468.87	4256.87	DGPS	100.00	-47.02	145.92
2017	RC	BER264-17	332432.43	8268469.77	4256.91	DGPS	100.00	-46.06	226.02
2017	RC	BER265-17	332080.20	8268589.88	4250.66	DGPS	80.00	-90.00	359.60
2017	RC	BER266-17	332080.03	8268589.09	4250.53	DGPS	80.00	-72.47	180.54
2017	RC	BER267-17	332165.46	8268552.82	4249.31	DGPS	100.00	-45.59	227.71
2017	RC	BER268-17	332035.53	8268511.42	4226.94	DGPS	163.00	-44.89	11.55
2017	RC	BER269-17	332034.96	8268509.48	4226.93	DGPS	105.00	-66.30	14.24
2017	RC	BER270-17	332033.88	8268510.41	4226.95	DGPS	63.00	-63.26	328.95
2017	RC	BER271-17	332037.09	8268510.70	4227.00	DGPS	45.00	-45.67	49.34
2017	RC	BER272-17	332144.27	8268461.71	4234.09	DGPS	200.00	-45.55	15.67
2017	RC	BER273-17	332143.67	8268459.65	4234.10	DGPS	57.00	-64.15	13.04
2017	RC	BER274-17	332142.12	8268461.39	4234.09	DGPS	77.00	-45.77	329.11
2017	RC	BER275-17	332145.99	8268461.08	4234.21	DGPS	160.00	-47.27	49.77
2017	RC	BER276-17	332144.53	8268459.86	4234.18	DGPS	60.00	-64.94	48.34
2017	RC	BER277-17	332479.36	8268405.84	4244.75	DGPS	120.00	-46.39	11.77
2017	RC	BER278-17	332476.08	8268405.41	4244.68	DGPS	135.00	-47.18	330.50
2017	RC	BER279-17	332477.13	8268403.85	4244.59	DGPS	110.00	-67.47	326.81
2017	RC	BER280-17	332481.53	8268404.41	4244.78	DGPS	150.00	-47.73	47.69
2017	RC	BER281-17	332480.20	8268403.25	4244.66	DGPS	110.00	-68.28	55.04
2017	RC	BER282-17	332420.20	8268403.68	4242.43	DGPS	130.00	-48.39	12.36
2017	RC	BER283-17	332419.79	8268401.99	4242.28	DGPS	120.00	-65.62	14.77
2017	RC	BER284-17	332416.35	8268403.51	4242.18	DGPS	130.00	-47.16	329.95
2017	RC	BER285-17	332422.98	8268402.23	4242.25	DGPS	140.00	-50.34	53.40
2017	RC	BER286-17	332421.64	8268401.10	4242.30	DGPS	135.00	-63.82	50.48
2017	RC	BER287-17	332581.11	8268637.86	4234.82	DGPS	140.00	-63.52	145.44
2017	RC	BER288-17	331639.15	8268582.60	4196.33	DGPS	150.00	-46.37	10.77
2017	RC	BER289-17	331638.66	8268580.74	4196.36	DGPS	140.00	-67.05	10.31

Year	Hole type[1]	Hole name	X	Y	Z	Survey method[2]	Hole depth	Dip (°)	Azimuth (°)
2017	RC	BER290-17	331636.42	8268572.91	4196.11	DGPS	100.00	-45.23	194.20
2017	RC	BER291-17	331636.99	8268575.04	4196.35	DGPS	100.00	-66.47	194.34
2019	DD	19BERE0001	332579.36	8268419.86	4197.12	DGPS	388.00	-69.60	205.97
2019	DD	19BERE0002	332478.62	8268443.53	4212.21	DGPS	343.00	-70.60	21.67
2019	DD	19BERE0003	331210.54	8268226.02	4157.47	DGPS	447.70	-65.00	17.67
2019	DD	19BERE0004	332040.00	8268300.00	4250.42	GPS	248.60	-81.80	13.57

Notes:
[1] RC = reverse circulation, DD = diamond core.
[2] GPS = handheld global positioning receiver, DGPS = licensed surveyor differential global positioning receiver with base station.
Source: Aftermath Berenguela database.

10.5 Significant intersections

A list of the significant intersections for the Berenguela project is provided in Appendix A. As there are four elements of potential commercial interest, the most rigorous way of defining the significant intersections is using a break-even NSR cut-off.

An NSR cut-off of $45/t has been assumed based on the following cost assumptions:

- Mining cost of $2.75/t
- Processing cost of $40/t
- General and administration of $5/t

The composite rules applied and NSR assumptions include:

- NSR assumptions:
  - Metal prices based on institutional long term consensus prices:
    - Ag: $20.00/oz, Cu: $3.06/lb, Zn: $1.07/lb.
  - Manganese sulphate ($MnSO_4$) with elemental Mn content of 32%, assumed to $500/t, based best available commercial information.
  - Metallurgical recoveries: Ag: 68%, Cu: 71%, Zn: 69%, and Mn as $MnSO_4$: 68%.
  - Missing values are assumed to be of zero grade.
- Minimum above cut-off composite length is 5 m.
- Maximum consecutive below cut-off intervals is one sample length, usually 1 m.
- Checks that internal sections of alternating below-above-below cut off segments are below cut-off NSR.

The intersections shown in Appendix A are intersected thickness. In Section 7 there are a set of sections which show the mineralized outline represented by a 2% manganese 3D surface and the drilling which can be seen to incorporate a number of angle holes, as multiple holes are drilled from each drill pad. A review of Figure 7.11 to Figure 7.16 will demonstrate the thickness of the mineralization.

Drilling is carried out with multiple holes from a single drill pad and the true thickness of mineralization is variable due to folding. However, above an NSR cut off of $45 the potential economic true thicknesses ranges from 16 – 75 m.

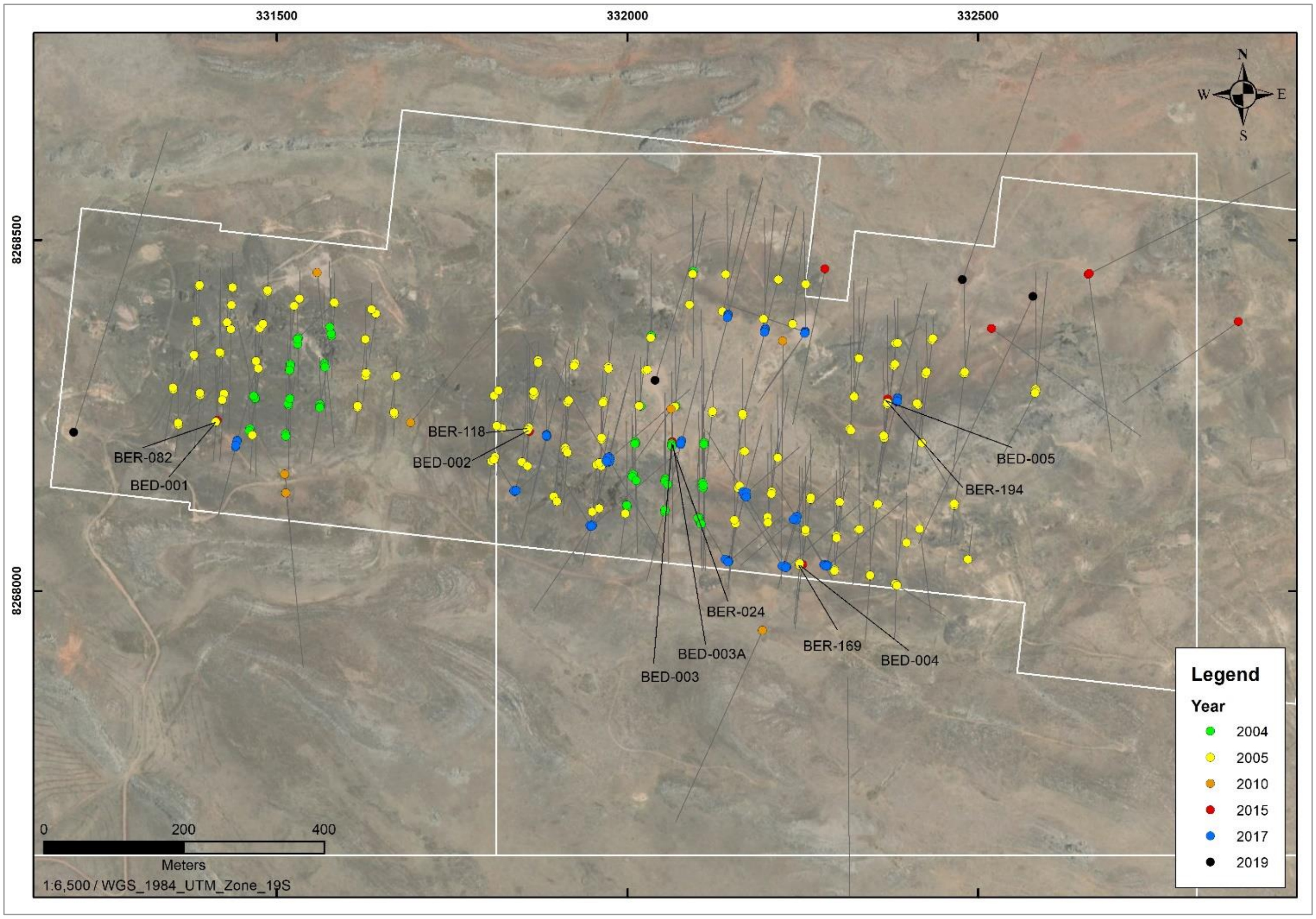
10.6 Twinned holes

As discussed in Section 10.3.4, in 2015 Silver Standard drilled six twin core holes adjacent to vertical RC holes drilled in the 2004 – 2005 program, of which one was a redrill. Thus two 2015 diamond core drillholes (BED-003 and BED-003A) twinned one 2004 RC drillhole (BER-024). Four 2005 RC drillholes were each twinned by a single diamond drillhole. The relative collar location of the holes is shown in Table 10.3. The location of the twin holes is shown in Figure 10.3 and side by side comparisons for silver are presented in Figure 10.4.

Table 10.3 Details of the RC and diamond core twin holes

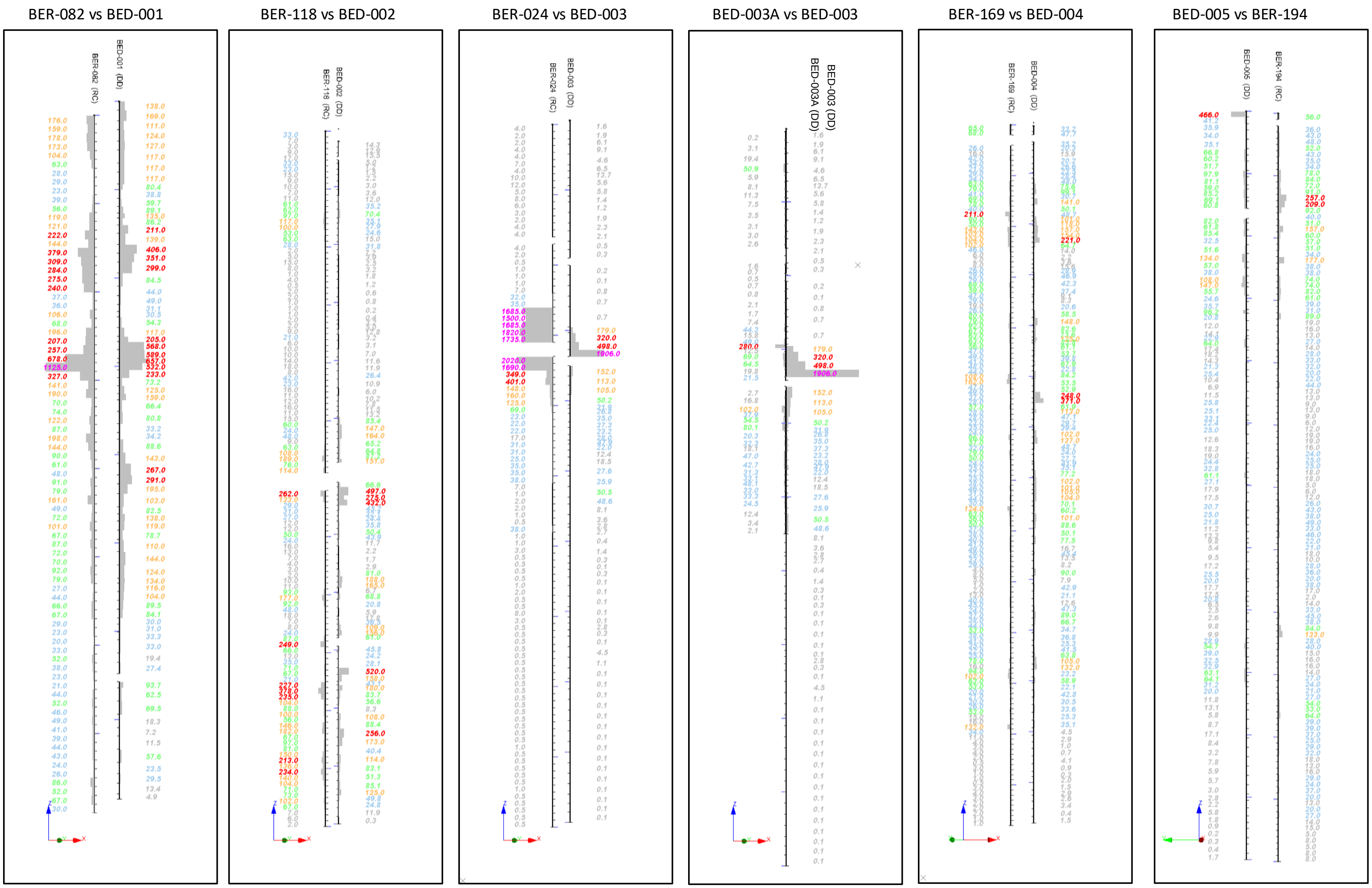
2004 - 2005 RC hole					2010 core holes					Diff X	Diff Y	Diff Z
Hole name	X	Y	Z	Depth (m)	Hole name	X	Y	Z	Depth (m)			
BER-024	332258.89	8268575.79	4251.02	100	BED-003	332259.47	8268580.53	4251.70	100.00	0.58	4.74	0.69
					BED-003A	332259.40	8268580.50	4251.70	55.00	0.51	4.71	0.69
BER-082	331608.39	8268609.07	4195.62	79	BED-001	331610.54	8268610.94	4197.20	79.00	2.15	1.87	1.58
BER-169	332441.77	8268407.00	4242.91	138	BED-004	332445.75	8268405.26	4243.39	138.00	3.98	-1.74	0.48
BER-118	332053.07	8268596.95	4249.87	118	BED-002	332056.01	8268595.56	4250.30	120.00	2.93	-1.38	0.43
BER-194	332567.31	8268636.36	4234.21	120	BED-005	332566.94	8268641.30	4234.54	120.00	-0.37	4.94	0.33

Figure 10.3 Location of the 2004 - 2005 RC and 2015 core twin hole program



Source: Aftermath 2021.

Figure 10.4 Comparison between twinned drillholes (Ag g/t)



Note: BER = RC holes and BED = diamond drillholes.

The one twinned 2004 RC drillhole BER-024 shows a poor correlation in both intersection width and grade tenor with 2015 diamond drillholes BED-003 and BED-003A. Review of sample weights from BED-024 indicate poor sample recovery associated with the mineralized interval which is likely indicative of poor drilling conditions and potential grade smearing and contamination. The poor correlation seen between 2015 diamond core drillholes BED-003 and BED-003A cannot be explained and requires further review.

Diamond core twins of 2005 RC drillholes show a considerably better correlation. Diamond drillholes show similar intersection lengths and similar grade tenor for Ag, Mn, Cu, and Zn. Similar mean grade and grade distributions are seen in both datasets.

10.7 Conclusion

Review of historical drilling data has highlighted a number of issues and areas of concern which require follow up.

Previous reports note that drilling issues were prevalent during the 2004 RC drilling program which resulted in poor sample recovery and potential smearing of grade. A single drillhole twin of 2004 drilling shows poor correlation between intersection lengths and grades. Twin drilling of 2005 RC drilling reported similar intersection lengths and grade tenor. This provided some confidence in the 2005 RC drilling.

A collar survey issue with 2004 and 2005 era RC drilling is also noted in previous reports. Previous operators completed partial resurveying of drillhole collars associated with these programs and noted -60 m in discrepancy in easting, -9 m in northing and 2 m in elevation. Drillhole collars from 2004 and 2005 that were not resurveyed were corrected by applying an adjustment factor.

AMC recommends the following work be completed:

- Complete studies on the nature of Ag, Mn, Cu, and Zn mineralization to understand the size, shape and distribution of the metals and enable an appropriate sub-sampling strategy to be developed.
- Complete additional checks of collar surveying to provide confidence in the location of 2004 and 2005 drillholes.
- Review historical data associated with the 2004 RC drilling program for records on poor drilling conditions, contamination, and wet samples or by using recorded laboratory sample weights to identify problematic intervals. Data associated with these drillholes should be flagged and excluded from any future Mineral Resource database.
- Continue using large diameter (HQ or PQ) triple tube diamond core to maximize sample size and core recovery, minimizing the loss of clay material.
- Complete additional twin drilling of RC drillholes with no recorded drilling issues. Recovery and sample volume effects between the two drilling methods should be reviewed.
- Review the available 2015 density data and determine a strategy for collection of density data in Aftermath's drilling programs, including a QA/QC regime. It is recommended that the wax method be used.

11 Sample preparation, analyses, and security

11.1 Introduction

This section describes the sampling methods, analytical techniques, and assay QA/QC protocols employed at the Property between 2004 – 2019. As mentioned in Section 10, pre-2014 holes were drilled by ASARCO and Charter but due to poor record keeping do not form part of the current project database.

The 2004, 2005, 2010, and 2015 programs were managed by Silver Standard. All work was carried out in accordance with the Silver Standard internal procedures. One program was carried out by Valor in 2017. In 2019, Rio Tinto completed four DD as part of a due diligence project. No written technical report is available for these drillholes; as such, there is no description of sampling methods and analysis.

QA/QC completed prior to February 2021 is described in prior Technical Reports. The QP has reviewed this work and, after independent analysis, accepts the results.

The main sources of information for this section of the report come from:

- Raw data and assay certificates supplied by Aftermath.
- Notes and explanations accompanying the raw data.
- McCrea, J.A., "Berenguela Project QA/QC Review", Prepared for Silver Standard, 2005 (2005 QA/QC Report).
- McCrea, J.A., "Technical Report on the Berenguela Property South – Central Peru, 2005", Prepared for Silver Standard, October 2005 (2005 Technical Report).
- Batelochi, M.A., "Technical Report and Updated Mineral Resource Estimate for the Berenguela Project", Prepared for Valor, February 2018 (2018 JORC Report).

11.2 Sampling methods

11.2.1 Silver Standard

Following is a summary of the sampling methods undertaken for the 2004 – 2005 Silver Standard program as stated in the 2005 Technical Report:

Silver Standard, during the 2004 and 2005 RC drill programs sampled the drillholes on one-metre intervals. RC drill samples were collected at the drill site by the drill crews. The RC drillholes were sampled from collar to total depth. Sampling intervals were dependent on the drilling equipment selected, the density of samples required and not based on geological controls or other features of the zone of interest.

RC samples were collected at the drill rig as follows:

- Samples were split by the drilling crew.
- Samples were split by a Jones splitter into three samples down to 1/8th size, creating samples ranging from 2 – 10 kg in weight.
- Approximately, every 40th sample had a second field duplicate sample taken.
- RC drillholes were sampled from collar to total depth.
- All samples were bagged and tagged, sent to the warehouse where they were prepared for shipment.
- Prior to shipment, blanks (1:40) and standards (1:20) were inserted into the sample stream.

The QP notes that while the procedure was to insert 1 blank every 40 samples, the actual insertion rate is much higher (see Table 11.4).

Following is a summary of the sample method from the 2018 JORC Report for the 2010 and 2015 DD campaigns carried out by Silver Standard:

- Sample intervals were generally 1.5 m, ranging from 0.5 – 1.5 m.
- Sample intervals were demarcated by geological characteristics.
- Samples were placed in plastic boxes and tagged and readied for shipment to the preparation laboratory.

11.2.2 Valor

The 2017 RC sampling program is summarized from the 2018 Valor JORC Report.

Samples were acquired from the cyclone and placed in two plastic bags for each 1.0 meter drilled. Samples were appropriately tagged. The material was quartered using a riffle splitter, in order to maximize homogeneity.

From the first splitter pass (2 trays) one of the trays (tray 1) was placed into a bag for logging (chip logging) and the remainder was divided into two samples A and B, approximate weight of 2 to 4 kg (combined weight A sample + B sample) to be sent to the laboratory and to be stored, respectively. For duplicate samples, sample A was split again.

11.3 Sample shipment and security

For the 2004, 2005, and 2010 programs Silver Standard staff would periodically deliver the samples to the ALS Chemex Labs depot in Arequipa and the samples were shipped to Lima, Peru for preparation. The assay pulps were shipped to ALS Chemex Labs in North Vancouver for analysis.

Samples in 2015 and 2017 were shipped to SGS Laboratories in Arequipa for preparation. The assay pulps were then sent to SGS Laboratories in Callao.

The 2019 samples were prepared and analyzed by ALS Lima.

All the RC samples are stored in a warehouse in Chorrillos, near Lima, Peru, and the cores from DD campaigns are stored in Santa Lucía.

11.4 Sample preparation and analysis

11.4.1 Silver Standard

Samples taken by Silver Standard for the 2004 – 2005 program were prepared as follows:

The samples were prepared using a standard sample preparation (PREP-31) to produce a 250-gram pulp. The analyses performed were four acid “near total” digestion with a 27 element ICP analysis (ME-ICP61). Samples over the maximum for silver, copper, or manganese we re-analyzed using Atomic Absorption (AA62b) and samples > 1,000 Ag ppm were analyzed using a fire assay procedure with a gravimetric finish (Ag- GRA21).

11.4.2 Valor

Following is the sample preparation procedure carried out for the 2017 RC program, as summarized in the 2018 Technical Report:

- Reception - Samples were received and checked with the sample form from Berenguela.
- Data Entry – SGS followed an internal procedure to generated CCONS where customer data was entered, then the “Presheet” worksheet was printed.
- Codified - checked against the physical sample vs client's form.
- Weight - samples were weighed online with the barcode reader.
- Drying - at 105°C controlled.
- Primary Crushing - Final product ~¼" (6 mm).
- Secondary Crushing - Final product at -10 # (2 mm) at 90% P_{80}.
- Homogenized pre-homogenized and again using riffle splitter.
- Riffle Splitter - Successive reduction size until obtained approx. 250 g and the reject was stored.
- Pulverized - Pulverized 250 g with final product -140 # at 90% P_{80}.
- Sample pulps were assayed by SGS – Callao – Peru. The analysis was carried out for two main Multi Element Analysis procedures: SGS-MN-ME-41 - ICP40B and SGS-MN-ME-41 - AAS41B.

11.4.3 Laboratory summary

Table 11.1 summarizes the preparation and analytical laboratories used in the QA/QC programs categorized by year and company. All laboratories were independent of the company issuing the samples.

Table 11.1 Summary of laboratory accreditation

Company	Year	Laboratory	Location	Accreditation
Silver Standard	2004 - 2005	ALS	Prep - ALS Lima, Peru S.A Analytical (RC) - North Vancouver	ISO 17025 ISO 9001
		Actlabs*	Umpire - Peru	
	2010, 2015	SGS Laboratories	Prep (DD) - Arequipa Analytical (DD) - Callao	ISO 17025 ISO 17025
Valor	2017	SGS Laboratories	Prep (DD) - Arequipa Analytical (DD) - Callao	ISO 17025 ISO 17025
Rio Tinto	2019	ALS	Lima, Peru	ISO 17025

Notes: *The QP is assuming that Actlabs was Actlabs Skyline Peru which was a subsidiary of Actlabs Canada at the time.

11.4.4 Detection limits

Table 11.2 summarizes the detection limits of the various analytical methods used from 2004 to 2019.

Table 11.2 Summary of detection limits

Laboratory	Year	Method	Detection limit range			
			Ag (ppm)	Cu (ppm)	Mn (ppm)	Zn (ppm)
ALS	2004	AA62	1 - 1000	10 - 100,000		
		AA62b	1 - 1000	10 - 100,000		
		Mn_Mn_AA62b			10 - 50,000	
		MnO_AA62b			10 - 50,000	
		Ag_GRA21	5 - 100,000			
		ICP41	0.2 - 100	1 - 10,000	5 - 10,000	2 - 10,000
		ME-ICP61a	1 - 200	10 - 100,000	10 - 100,000	20 - 100,000
ALS	2005	AA62	1 - 1000	10 - 100,000		
		AA62b	1 - 1000	10 - 100,000		
		Mn_Mn_AA62b			10 - 50,000	
		MnO_AA62b			10 - 50,000	
		Ag_GRA21	5 - 100,000			
		ICP41	0.2 - 100	1 - 10,000	5 - 10,000	2 - 10,000
		ME-ICP61a	1 - 200	10 - 100,000	10 - 100,000	20 - 100,000
ALS	2010	AA62	1 - 1000	10 - 100,000		
		AA62b	1 - 1000	10 - 100,000		
		Mn_Mn_AA62b			10 - 50,000	
		MnO_AA62b			10 - 50,000	
		Ag_GRA21	5 - 100,000			
		ICP41	0.2 - 100	1 - 10,000	5 - 10,000	2 - 10,000
		ME-ICP61a	1 - 200	10 - 100,000	10 - 100,000	20 - 100,000
SGS	2015	ICP40B	0.2 - 100	0.5 - 10,000	2 - 10,000	0.5 - 10,000
		AAS41B	10 - 4,000	20 - 20,000	10 - 20,000	100 - 20,000
SGS	2017	ICP40B	0.2 - 100	0.5 - 10,000	2 - 10,000	0.5 - 10,000
		AAS41B	10 - 4,000	20 - 20,000	10 - 20,000	100 - 20,000
ALS	2019	ME-MS61L	0.002 - UKN	200 - UKN	0.2 - UKN	0.2 - UKN
		OG62				10 - UKN

Note: UKN = Upper Detection Limit for these analytical methods is not known.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

11.5 Quality Assurance and Quality Control

The following discussion is based on the QP's independent review of the RC and DD sampling QA/QC databases associated with the 2004 – 2005, 2010, and 2015, 2017, and 2019 programs.

Certified reference materials (CRMs), blanks and duplicate samples are monitored for Ag, Cu, Zn, Mn, Pb, and Au assay values. Only Ag, Cu, Zn, and Mn are discussed as they are important to any future the Mineral Resource estimates.

A summary of QA/QC samples analyzed in all programs are presented in Table 11.3. Table 11.4 summarizes the insertion rate of these QA/QC samples. The summaries are tabulated by year, drilling type and company.

Table 11.3 QA/QC samples by year

Year	Company	Drilling type	Drill samples	CRMs	Blanks	Field duplicates	Coarse duplicates	Pulp duplicates	Umpire samples
2004 - 2005	Silver Standard	RC	18,483	948	1,048	524	-	-	559
2010		DD	1,620	95	94	92	-	-	-
2015		DD	1,520	28	40	38	-	-	-
2017	Valor	RC	8,465	148	99	198	-	-	-
2019	Rio Tinto	DD	705	41	36	24	-	-	-
Total			**30,793**	**1,260**	**1,317**	**876**	**-**	**-**	**-**

Notes:

- Count of unique samples is based on silver assays. There are small variations in number of analyses between silver and other analyzed elements.
- Samples may have been analyzed by a number of methods.
- Count of field duplicates include all sample ids submitted whether valid results were returned or not.
- QA/QC insertion rates reflects the samples located in the database. Reported numbers in previous reports are higher for the umpire samples.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.4 QA/QC insertion rates

Year	Company	CRMs	Blanks	Field duplicates	Coarse duplicates	Pulp duplicates	Umpire samples
2004-2005	Silver Standard	5%	6%	3%	0%	0%	3%
2010		6%	6%	6%	0%	0%	0%
2015		2%	3%	3%	0%	0%	0%
2017	Valor	2%	1%	2%	0%	0%	0%
2019	Rio Tinto	6%	5%	3%	0%	0%	0%

Notes:

- Count of unique samples is based on silver assays. There are small variations in number of analyses between silver and other analyzed elements.
- Samples may have been analyzed by a number of methods.
- Count of field duplicates include all sample ids submitted whether valid results were returned or not.
- QA/QC insertion rates reflects the samples located in the database. Reported numbers in previous reports are higher for the umpire samples.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

11.5.1 Certified Reference Materials

11.5.1.1 Description

For the 2004 – 2005 program, CRMs were supplied as 100 g pulp bags.

A total of 12 different CRMs were used from 2004 - 2019. Table 11.5 to Table 11.8 summarize the CRMs used for each element. Not all CRMs used have certified values for all Ag, Cu, Mn, and Zn. All certificates for the Silver Standard sourced CRMs (HIGH, MEDIUM, LOW) are missing; as such, results of these are not reported.

Table 11.5 Summary of silver CRMs

CRM ID	Source	Ag (g/t) ICP		Ag (g/t) FA		No. of samples / year					
		Expected value	SD	Expected value	SD	2004 - 2005	2010	2015	2017	2019	Total
CDN-HZ-2	CDN	61.10	2.05					17	49		66
CDN-ME-12	CDN	52.50	2.15				36	11	50		97
CDN-ME-4	CDN	414.00	8.5	402	12.5		36	16	49		101
OREAS600b	OREAS	25.10	1							38	38
OREAS603b	OREAS	301	10	297	8					3	3
AMARILLO	ALS	145	0.5			428					428
AZUL	ALS	No certified value				92					92
ROJO	ALS	640	2			433					433
VERDE	ALS	No certified value				114					114
HIGH	SS						8				8
MEDIUM	SS						8				8
LOW	SS						7				7

Notes:
- CDN = CDN Resource Laboratories Ltd
- SS = Silver Standard
- OREAS = Ore Research and Exploration P/L
- ALS = ALS Chemex Peru
- ICP = Silver certified as 4 acid digestion with Atomic Absorption or ICP finish
- FA = Silver certified as Fire Assay with gravimetric finish
- SD = Standard deviation

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.6 Summary of copper CRMs

		Cu (%)		No. of samples / year					
CRM ID	Source	Expected value	SD	2004 - 2005	2010	2015	2017	2019	Total
CDN-HZ-2	CDN	1.36	0.03			17	49		66
CDN-ME-12	CDN	0.428	0.01		36	11	50		97
CDN-ME-4	CDN	1.83	0.04		36	15	49		100
OREAS600b	OREAS	0.0499	0.0013					38	38
OREAS603b	OREAS	0.0000973	0.0000023					3	3
AMARILLO	ALS	1.1	0.005	428					428
AZUL	ALS	0.0013	0.0001	92					92
ROJO	ALS	1.02	0.015	433					433
VERDE	ALS	No certified value		114					114
HIGH	SS				8				8
MEDIUM	SS				8				8
LOW	SS				7				7

Notes:
- CDN = CDN Resource Laboratories Ltd
- SS = Silver Standard
- OREAS = Ore Research and Exploration P/L
- ALS = ALS Chemex Peru
- Analytical Method – Cu, Mn, and Zn are certified as 4 acid digestion with Atomic Absorption or ICP finish
- SD = Standard deviation

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.7 Summary of manganese CRMs

CRM ID	Source	Mn (%)		No. of samples / year					
		Expected value	SD	2004 - 2005	2010	2015	2017	2019	Total
CDN-HZ-2	CDN	No certified value							0
CDN-ME-12	CDN								0
CDN-ME-4	CDN								0
OREAS600b	OREAS	0.0293	0.0012					38	38
OREAS603b	OREAS	0.0142	0.0008					3	3
AMARILLO	ALS	16.56	0.035	409					409
AZUL	ALS	0.036	0.00155	92					92
ROJO	ALS	21.38	0.255	413					413
VERDE	ALS	No certified value							0
HIGH	SS								0
MEDIUM	SS								0
LOW	SS								0

Notes:
- CDN = CDN Resource Laboratories Ltd
- SS = Silver Standard
- OREAS = Ore Research and Exploration P/L
- ALS = ALS Chemex Peru
- Analytical Method – Cu, Mn, and Zn are certified as 4 acid digestion with Atomic Absorption or ICP finish
- SD = Standard deviation

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.8 Summary of zinc CRMs

CRM ID	Source	Zn (%)		No. of samples / year					
		Expected value	SD	2004 - 2005	2010	2015	2017	2019	Total
CDN-HZ-2	CDN	7.20	0.18			17	49		66
CDN-ME-12	CDN	0.28	0.01		36	11	50		97
CDN-ME-4	CDN	1.10	0.03		36	16	49		101
OREAS600b	OREAS	0.0404	0.0014					38	38
OREAS603b	OREAS	0.1990	0.007					3	3
AMARILLO	ALS	No certified value							0
AZUL	ALS								0
ROJO	ALS								0
VERDE	ALS								0
HIGH	SS								0
MEDIUM	SS								0
LOW	SS								0

Notes:
- CDN = CDN Resource Laboratories Ltd
- SS = Silver Standard
- OREAS = Ore Research and Exploration P/L
- ALS = ALS Chemex Peru
- Analytical Method – Cu, Mn, and Zn are certified as 4 acid digestion with Atomic Absorption or ICP finish
- SD = Standard deviation

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Each CRM was subjected to differing levels of round robin analysis. Table 11.9 summarizes the number of laboratories and number of samples involved in round robin testing for each CRM and element. The CRMs used in 2004 and 2005 were not tested as robustly as subsequent CRM material.

Table 11.9 Summary of CRM round-robin testing

CRM ID	Source	# Labs / # samples			
		Ag	Cu	Mn	Zn
CDN-HZ-2	CDN	12 / 120	12 / 120		
CDN-ME-12	CDN	14 / 140	14 / 140		
CDN-ME-4	CDN	10 / 100	13 / 130		13 / 130
OREAS600b	OREAS	22 / 132	22 / 132	22 / 132	22 / 132
OREAS603b	OREAS	22 / 132	22 / 132	22 / 132	22 / 132
AMARILLO	ALS	6 / 60	6 / 60	6 / 60	
AZUL	ALS	6 / 60	6 / 60	6 / 59	
ROJO	ALS	6 / 60	6 / 58	6 / 60	

Notes:
- CDN = CDN Resource Laboratories Ltd
- SS = Silver Standard
- OREAS = Ore Research and Exploration P/L
- ALS = ALS Chemex Peru

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

11.5.1.2 Discussion on CRMs

CRMs contain standard, predetermined concentrations of material which are inserted into the sample stream to check the analytical accuracy of the laboratory. Industry best practice typically advocates an insertion rate of at least 5 – 6% of the total samples assayed (Long et al. 1997; Mendez 2011; Rossi and Deutsch 2014). For each economic mineral it is recommended to use at least three CRMs with values:

- At the approximate cut-off grade (COG) of the deposit.
- At the approximate expected grade of the deposit.
- At a higher grade.

The insertion rate of CRMs varied across the different programs. Ideally, an insertion rate of 5% of total samples is required. The 2015 and 2017 programs did not meet this requirement, where insertion rates were 2% relative to total samples.

The average grade of the historical Mineral Resource is approximately 85 g/t Ag, 0.76% Cu, 5.1% Mn, and 0.28% Zn. At present, there is no expected COGs for the deposit. A 0.5% copper equivalent was used to estimate the historical Mineral Resource. This roughly equates to 50 g/t Ag, 0.2% Cu, and 0.1% Zn. The CDN CRMs monitor the average and high-grade materials, the ALS CRMs monitor higher-grade material.

Industry best practice is to investigate, and where necessary re-assay, batches where two consecutive CRMs in a batch occur outside two standard deviations (warning), or one CRM occurs outside of three standard deviations (fail) of the expected value described on the assay certificate. The previous technical reports do not explicitly specify what criteria was used by each company to assess the failure of CRM samples. There were no procedures in place to re-run samples if failures did occur. When analyzing the CRM results, the author of the 2018 Technical Report discusses failure rates but does not define what is considered a failed CRM sample.

Control charts are commonly used to monitor the analytical performance of an individual CRM over time. CRM assay results are plotted in order of analysis along the X axis. Assay values of the CRM are plotted on the Y axis. Control lines are also plotted on the chart for the expected value of the CRM, two standard deviations above and below the expected value (defining a warning threshold), and three standard deviations above and below the expected value (defining a fail threshold). Control charts show analytical drift, bias, trends, and irregularities occurring at the laboratory over time.

Table 11.10 to Table 11.13 show the CRM performance for Ag, Cu, Mn, and Zn, respectively, for the period 2004 – 2019.

Table 11.10 Ag CRM results (2004 - 2019)

CRM ID	Analytical method	Number of assays	Low warning (-2SD)	High warning (+2SD)	Low fail (-3SD)	High fail (+3SD)	Fail rate (>3SD)
CDN-HZ-2	Ag_ICP40B_ppm	66	0	0	2	0	3%
CDN-ME-12	Ag_ICP40B_ppm	61	0	0	1	2	5%
	Ag_ME-ICP61a_ppm	36	3	0	0	0	0%
CDN-ME-4	Ag_AAS41B_g/t	44	0	0	0	0	0%
	Ag_Ag-AA62_ppm	36	2	0	1	0	3%
	Ag_ICP40B_ppm	21	0	0	0	0	0%
OREAS600b	Ag_ME-MS61L_ppm	38	0	1	0	0	0%
OREAS603b	Ag_Ag-OG62_ppm	3	0	0	0	0	0%
AMARILLO	Ag_ME-ICP61a_ppm	428	0	18	208	150	84%
ROJO	Ag_Ag-AA62_ppm	319	4	0	287	3	91%
	Ag_Ag-AA62b_ppm	94	0	0	76	7	88%
	Ag_ME-ICP61a_ppm	20	0	0	20	0	100%

Note: SD=standard deviation.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.11 Cu CRM results (2004 - 2019)

CRM ID	Analytical method	Number of assays	Low warning (-2SD)	High warning (+2SD)	Low fail (-3SD)	High fail (+3SD)	Fail rate (>3SD)
CDN-HZ-2	Cu_AAS41B_%	66	0	0	0	2	3%
CDN-ME-12	Cu_AAS41B_%	2	0	0	0	2	100%
	Cu_ICP40B_ppm	59	0	19	0	5	8%
	Cu_ME-ICP61a_ppm	36	1	0	0	0	0%
CDN-ME-4	Cu_AAS41B_%	65	0	0	0	0	0%
	Cu_ME-ICP61a_ppm	36	1	3	0	0	0%
OREAS600b	Cu_ME-MS61L_ppm	38	3	0	0	0	0%
OREAS603b	Cu_ME-MS61L_ppm	3	0	0	1	0	33%
AMARILLO	Cu_ME-ICP61a_ppm	428	0	0	103	127	54%
AZUL	Cu_ME-ICP61a_ppm	92	0	0	1	45	50%
ROJO	Cu_ME-ICP61a_ppm	433	88	4	63	8	16%

Note: SD=standard deviation.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.12 Mn CRM results (2004 - 2019)

CRM ID	Analytical method	Number of assays	Low warning (-2SD)	High warning (+2SD)	Low fail (-3SD)	High fail (+3SD)	Fail rate (>3SD)
OREAS600b	Mn_ICP40B_ppm	3	0	0	0	3	100%
	Mn_ME-MS61L_ppm	35	0	0	0	0	0%
OREAS603b	Mn_ME-MS61L_ppm	3	0	1	0	2	67%
AMARILLO	Mn_Mn-AA62b_%	71	2	1	37	18	77%
	MnO_Mn-AA62_%	338	0	32	61	206	79%
AZUL	Mn_ME-ICP61a_ppm	92	0	11	1	49	54%
ROJO	Mn_Mn-AA62b_%	72	6	4	2	2	6%
	MnO_Mn-AA62_%	341	11	42	7	41	14%

Note: SD=standard deviation.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.13 Zn CRM results (2004 - 2019)

CRM ID	Analytical method	Number of assays	Low warning (-2SD)	High warning (+2SD)	Low fail (-3SD)	High fail (+3SD)	Fail rate (>3SD)
CDN-HZ-2	Zn_AAS41B_%	64	25	0	1	0	2%
	Zn_ICP40B_ppm	2	0	0	2	0	100%
CDN-ME-12	Zn_AAS41B_%	2	0	0	2	0	100%
	Zn_ICP40B_ppm	59	0	0	0	0	0%
	Zn_ME-ICP61a_ppm	36	2	0	0	0	0%
CDN-ME-4	Zn_AAS41B_%	65	0	0	0	0	0%
	Zn_ME-ICP61a_ppm	36	0	0	0	0	0%
OREAS600b	Zn_ME-MS61L_ppm	38	0	0	0	0	0%
OREAS603b	Zn_ME-MS61L_ppm	3	0	0	0	3	100%

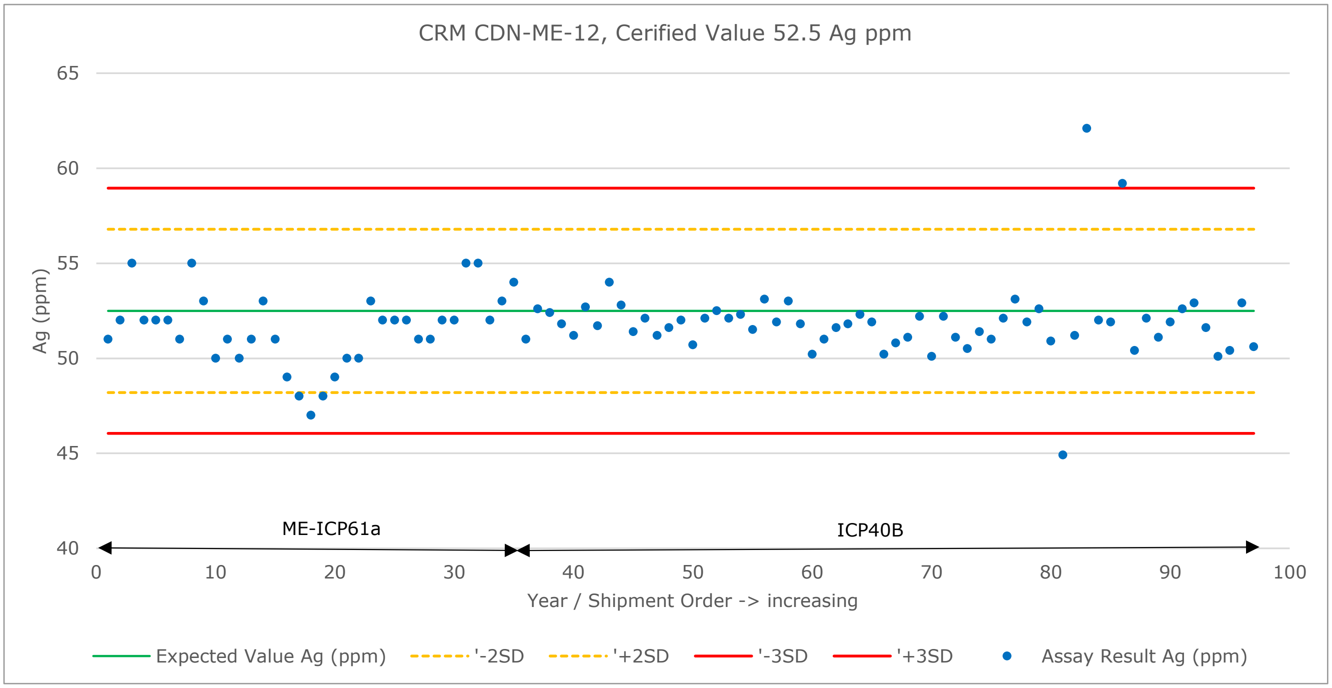
Note: SD=standard deviation.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

The following comments are made regarding failure rates:

- Ideally, CRM failure rates should be less than 5%.
- Any CRM with less than 10 samples are not considered in the discussion.
- There is a very high failure rate for CRMs used in the 2004 – 2005 programs.
- The AZUL CRM failures for Cu could be attributed to the CRM value being below the detection limit of the analytical method used.
- There was limited round robin testwork to define Amarillo, Azul, and Rojo CRMs, and thus a question of the validity of the statistics. The basis of all the pass / fail analysis is questionable.
- Only limited CRMs were analyzed for Mn.
- All CRMs used from 2010 – 2019 preformed relatively well for all elements and analytical methods, excluding those analytical methods with limited sampling.

Figure 11.1 to Figure 11.6 present selected CRM control charts for silver, copper, manganese, and zinc.

Figure 11.1 Control chart for CDN-HZ-12 (Ag), drillhole samples

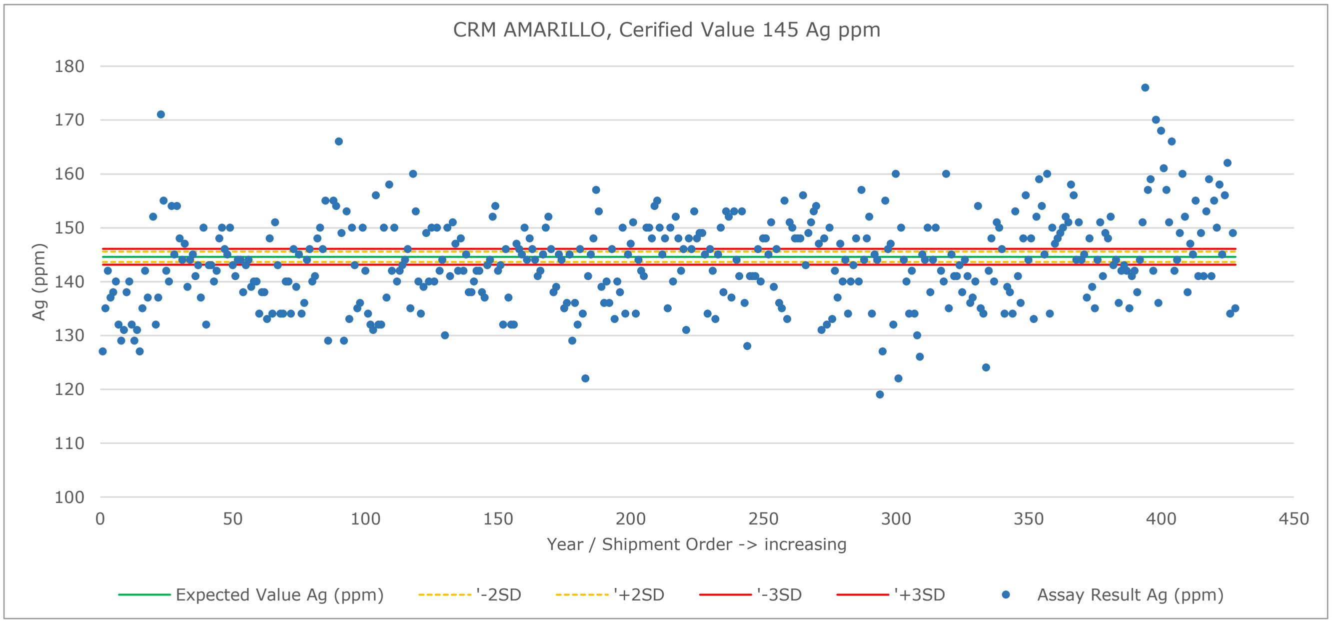


Notes:

- Data shown is from 2010 - 2017.
- 2010: Sample 1 – 36, analytical method Ag_ME-ICP61a_ppm.
- 2015 – 2017: Sample 37 onwards, analytical method Ag_ICP40B_ppm.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.2 Control chart for AMARILLO (Ag), drillhole samples

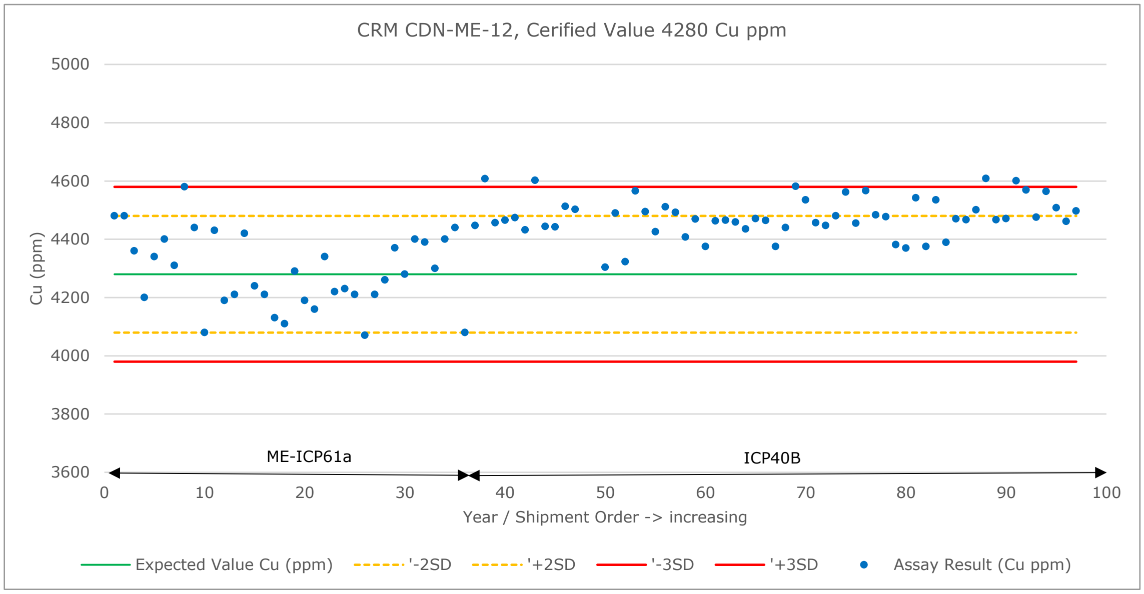


Notes:

- Data shown is from 2004 - 2005.
- Analytical method ME-ICP61a_ppm.
- Two samples analyzed returned values less than 20 ppm and are not shown on the graph above.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

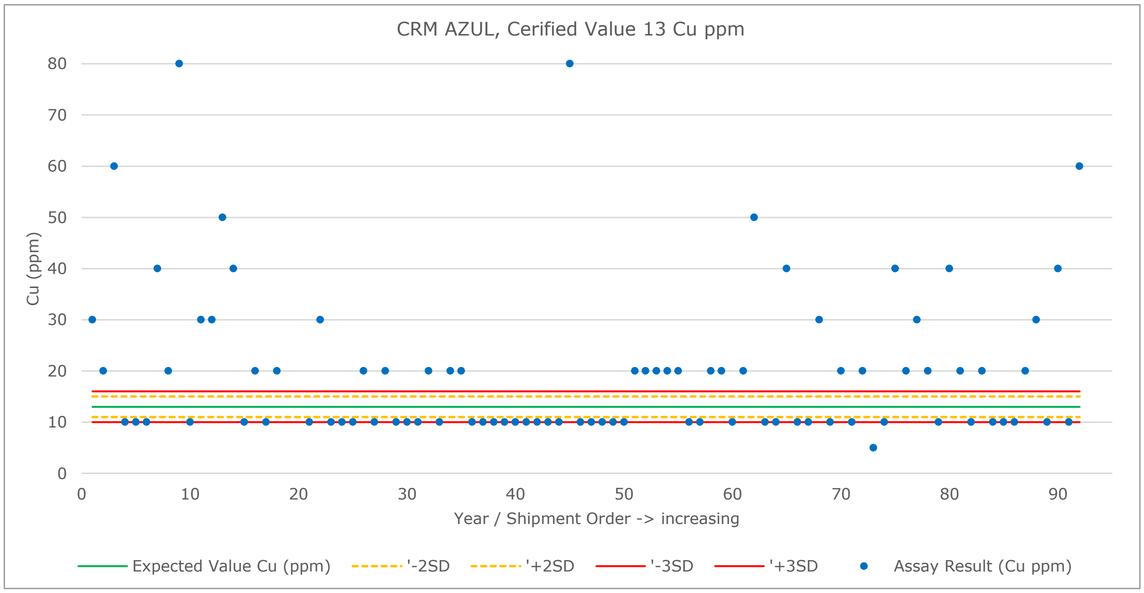
Figure 11.3 Control chart for CRM CDN-ME-12 (Cu), drillhole samples



Notes:
- Data shown is from 2010 - 2017.
- Analytical method from sample 0 – 36 (2010) Cu_ME-ICP61a_ppm, 38 (2015 – 2017) onwards Cu_ICP40B_ppm.
- The Cu_ICP40B_ppm shows a positive bias. This method was used at the end of the 2015 program and for all the 2017 program. Note the CRM was certified for this analytical method.
- Two samples analyzed using Cu_AAS41B_% returned values greater than 13,000 ppm and are not shown on the graph above. These were the only two samples analyzed by this method for this CRM.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

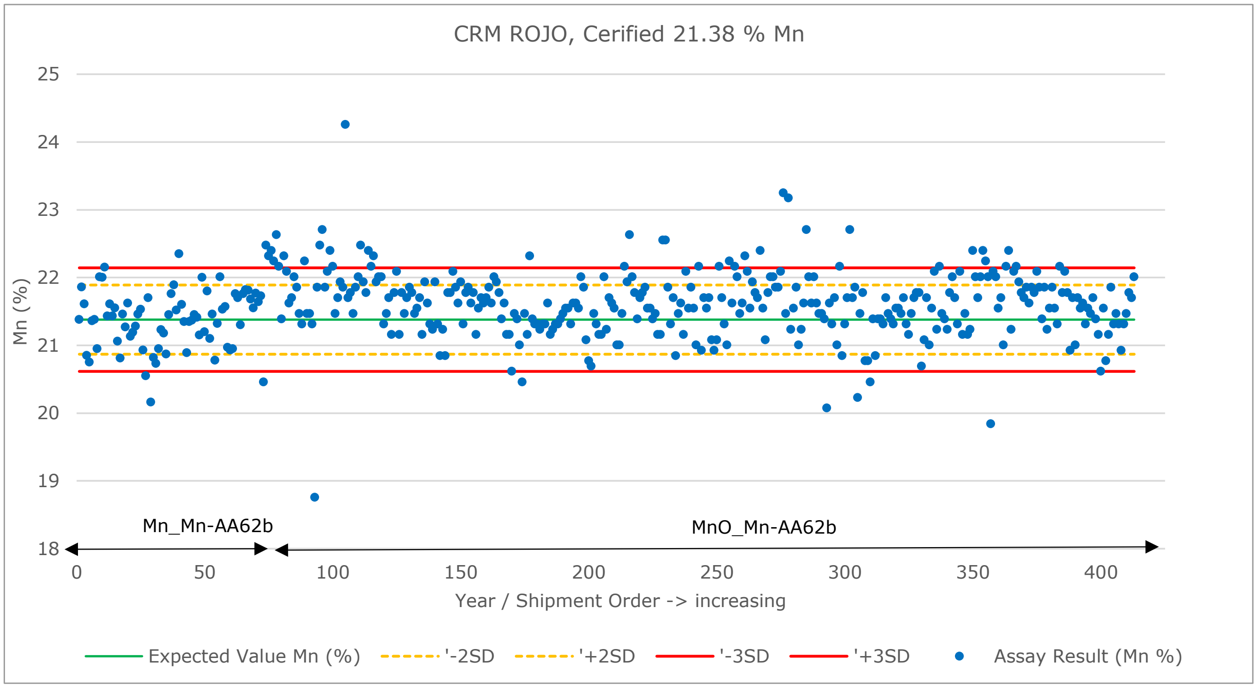
Figure 11.4 Control chart for CRM AZUL (Cu), drillhole samples



Notes:
- Data shown is from 2004.
- Analytical method ME-ICP61a_ppm.
- Two samples analyzed returned values greater than 80 ppm and are not shown on the graph above.
- There appears to be two different lower detection limits, 10 ppm and 20 ppm.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

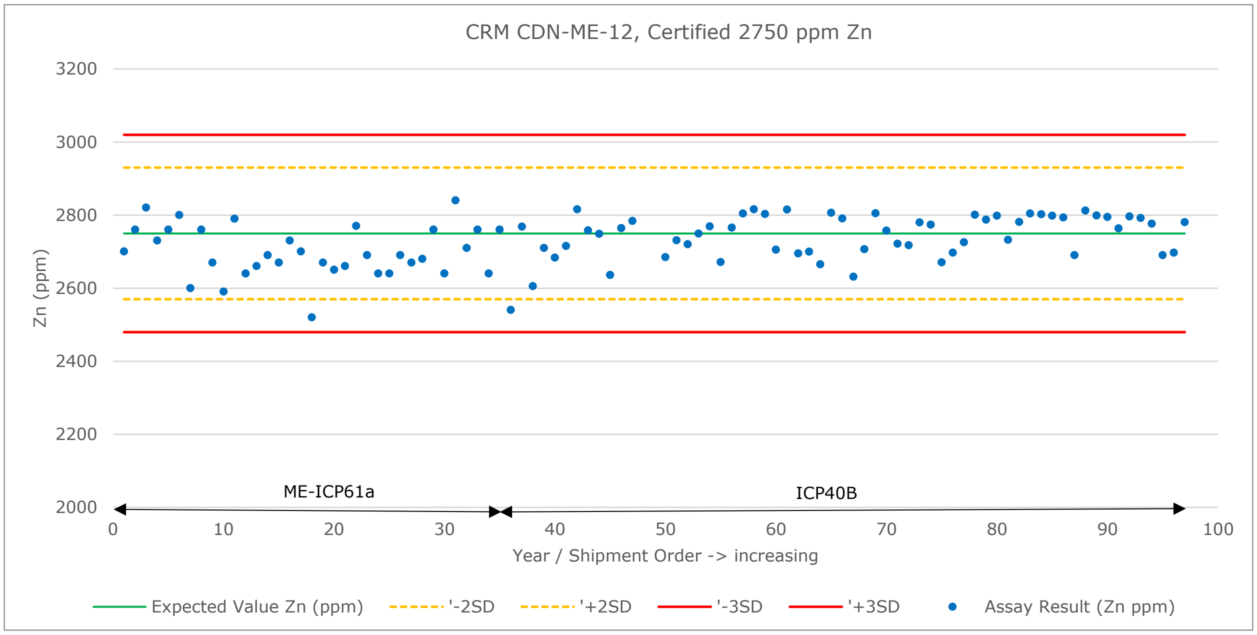
Figure 11.5 Control chart for CRM ROJO (Mn), drillhole samples



Notes:
- Data shown is from 2004 - 2005.
- Analytical method from sample 0 – 72 Mn_Mn-AA62b_% (2004), 107 onwards MnO_Mn-AA62_% (2004 – 2005).

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.6 Control chart for CRM CDN-ME-12 (Zn), drillhole samples



Notes:
- Data shown is from 2010 - 2017.
- Analytical method from sample 0 – 36 (2010) Zn_ME-ICP61a_ppm, 36 (2015 – 2017) onwards Zn_ICP40B_ppm.
- Two samples analyzed using Zn_AAS41B_% returned values greater than 6000 ppm and are not shown on the graph above. These were the only two samples analyzed by this method for this CRM.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

The CRMs used over the life of the project do cover the expected grade ranges. However, there are problems with some CRMs being near the detection limit of the analytical methods, the veracity with which the CRMs have been certified and the low insertion rates of some CRMs.

A review of the control charts found a distinct change in CRM performance between the 2004 - 2005 program against all subsequent programs.

The performance of the 2004 – 2005 CRMs is poor and the following is noted:

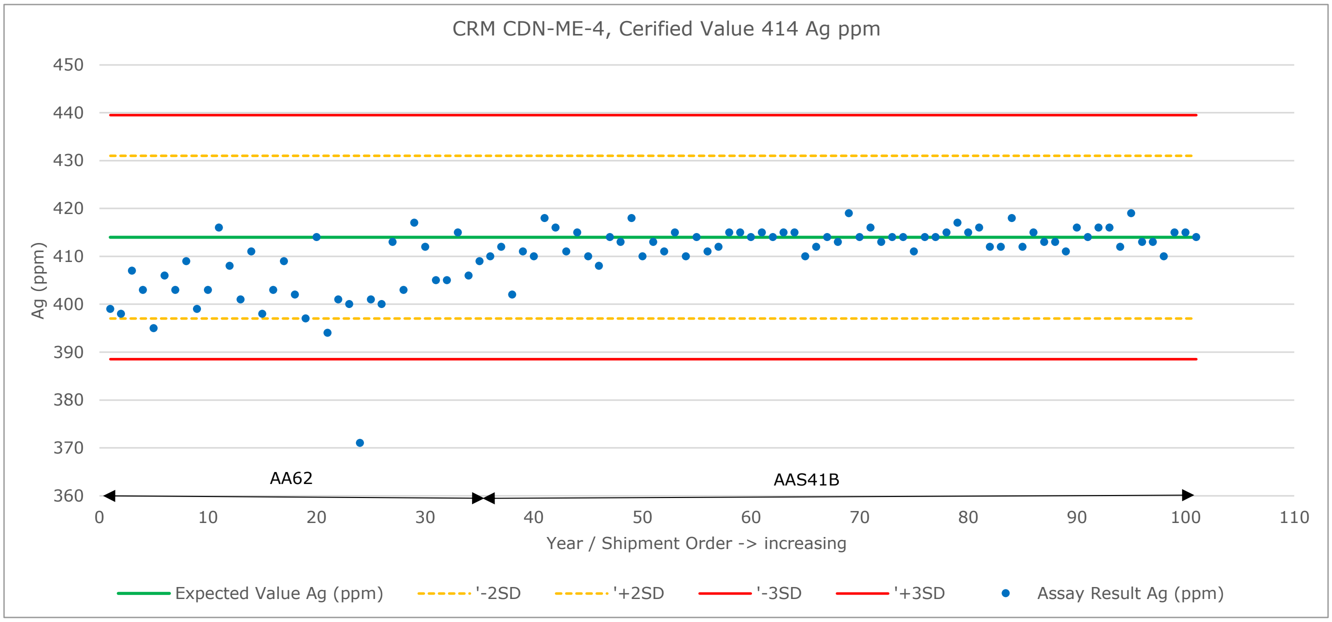
- There does not seem to be a pattern of failure, i.e., not always high or low.
- There was no change in laboratory between the 2005 and 2010, only a change in CRMs used. The company in ownership remained the same.
- The change in laboratory in 2015 might account for some of the improvements, however, it is more likely an issue with the CRM material.
- No corrective measures (e.g., re-run batches) were completed. It is difficult to pin-point the exact cause of the poor performance.
- The AZUL CRM for Cu shows there might be a problem with the CRM being at the detection limit of the analytical method. The CRM is certified at 13 ppm and the detection limit of the ME-ICP61a analytical method is 10 ppm. It also appears that the lower detection limit was 20 ppm at times. All samples for the AZUL CRM were analyzed in 2004.
- The CRMs produced by ALS Chemex for the 2004 – 2005 program (AMARILLO, AZUL, and ROJO) were subjected to limited round robin analysis compared to the other CRMs; six laboratories and 60 samples versus > 15 laboratories and > 100 samples for the CDN and OREAS CRMs. Review of the CRM certificates showed that the RSD % for Azul exceeded 5% for both Cu and Mn.

The performance of the CRMs from 2010 onwards is reasonable. There are differences seen in performance based on analytical methods, most notably:

- For CRM CDN-ME-4 Ag, there was a notable change in bias on account of the analytical method (Figure 11.7). The analytical method used in 2010 was Ag_Ag-AA62_ppm. All assay results using this method are below the expected value. The method used in 2015 and 2017, Ag_AAS41B_g/t, show all samples as a tight grouping around the expected value.
- For CRM CDN-ME-4 Cu, there was a notable change in bias on account of the analytical method. The analytical method used in 2010 was Cu_ME-ICP61a_ppm. All assay results using this method are significantly scattered around the expected value (within failure limits). The method used in 2015 and 2017, Cu_AAS41B_%, shows all samples analyzed as a tight grouping around the expected value (Figure 11.8).
- For CRM CDN-ME-4 Zn, there was a notable change in bias on account of the analytical method. The analytical method used in 2010 was Zn_ME-ICP61a_ppm. All assay results using this method are significantly scattered around the expected value (within failure limits). The method used in 2015 and 2017, Zn_AAS41B_%, shows most samples analyzed as below the expected value (Figure 11.9).
- For the CRM CDN-ME-12 Cu, there was a notable change in bias on account of the analytical method. The analytical method used in 2015 and 2017 was Cu_ICP40B_ppm. All assay results using this method are above the expected value. The 2010 analytical method used was Cu_ME-ICP61a_ppm. Values using this method show a fair degree of scatter around the expected value (Figure 11.3).

The differences in CRM performance (2010 – 2017) based on analytical method are not considered to be material. Monitoring of the Cu grades should be considered as the bias noted was towards higher copper values.

Figure 11.7 Control chart for CRM CDN-ME-4 (Ag), drillhole samples

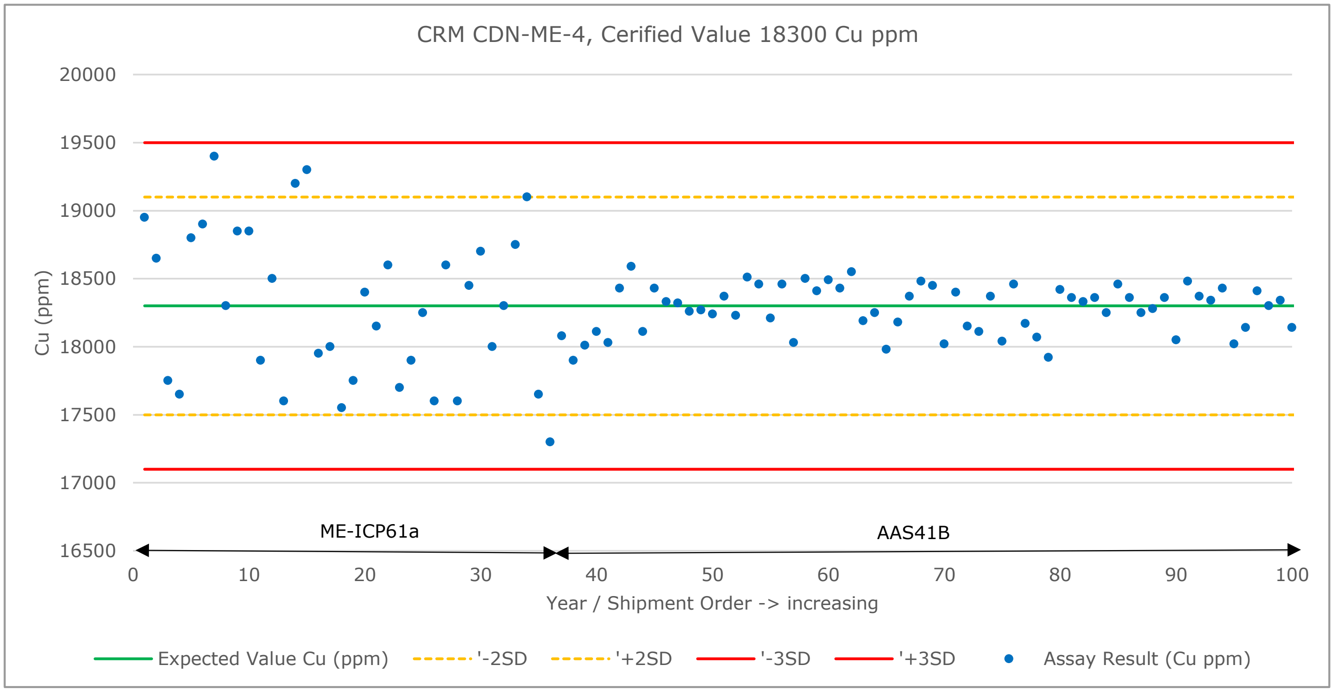


Notes:

- Data shown is from 2010 - 2017.
- 2010: Sample 1 – 36, analytical method Ag_AAS62_ppm.
- 2015 – 2017: Sample 37 onwards, analytical method Ag_AAS41B_ppm.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.8 Control chart for CRM CDN-ME-4 (Cu), drillhole samples

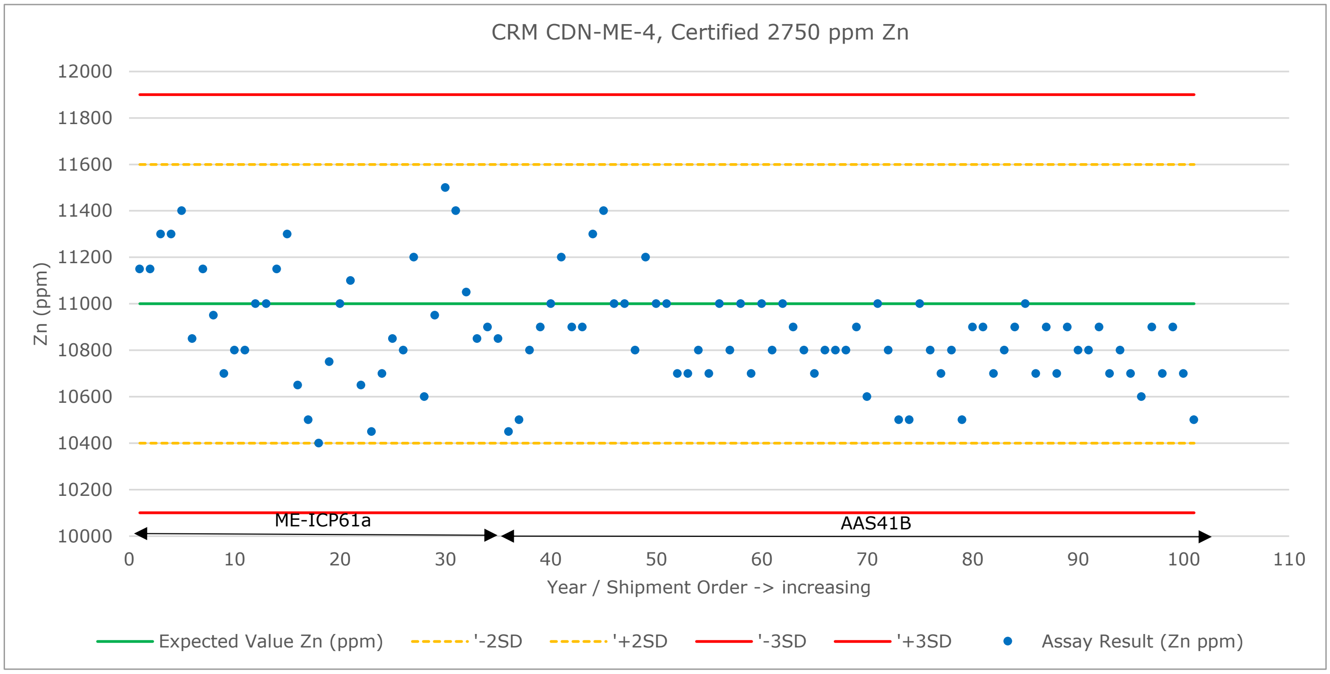


Notes:

- Data shown is from 2010 - 2017.
- Analytical method from sample 0 – 36 (2010) Cu_ME-ICP61a_ppm, 36 (2015 – 2017) onwards Cu_AAS41B.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.9 Control chart for CRM CDN-ME-4 (Zn), drillhole samples



Notes:
- Data shown is from 2010 - 2017.
- Analytical method from sample 0 – 36 (2010) Zn_ME-ICP61a_ppm, 36 (2015 – 2017) onwards Zn_AAS41B.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

11.5.1.3 Recommendations for CRMs

The QP makes the following recommendations for CRMs in future drill programs:

- Purchase CRMs at the approximate COG, average grades, and higher grades of the deposits.
- Include CRMs in every batch of samples submitted at a rate of at least 1 in every 20 samples (5%).
- Ensure that CRMs are monitored in real time on a batch-by-batch basis, and that remedial action is taken immediately as issues are identified.
- Adjust CRM monitoring criteria such that assay batches with two consecutive CRMs outside two standard deviations, or one CRM outside of three standard deviations are investigated, and if necessary re-analyzed.
- Ensure CRM warnings, failures and remedial action are documented (i.e., table of fails).

11.5.2 Blank samples

11.5.2.1 Description

Coarse blank samples were inserted into the sample stream of drill programs completed between 2004 - 2019. Coarse blanks were made up of fluvial sand material; however, it is unclear where this material was collected.

Pulp blanks were not incorporated into the QA/QC program.

Insertion rates for coarse blank materials have varied. All years, except for 2015 and 2017, were above 5%.

There is no information in the previous technical reports or historical data that was discovered regarding the pass / fail criteria for blanks and how failures were managed.

11.5.2.2 Discussion on blanks

Coarse blanks test for contamination during both the sample preparation and assay process. Pulp blanks test for contamination occurring during the analytical process. Both coarse and fine blanks should be inserted in each batch sent to the laboratory and comprise 4 - 5% of total samples submitted (Long et al. 1997; Mendez 2011; Rossi and Deutsch 2014).

The generally accepted criteria are that 80% of coarse blanks should be less than three times of the detection limit.

Table 11.14 shows the assay results from blank material for 2004 – 2019. The differing detection limits for each laboratory are taken into account when calculating the fail limit. Due to the low detection rates on many of these analytical methods, a blank could fail the criteria but still have no material impact on a future Mineral Resource. To account for this, the QP used probability plots and histograms of the drill database to ascertain background breaks for each element. The background breaks were used to substitute the value of the lower detection limit. The values used are 15 g/t Ag, 0.05% Mn, 0.01% Cu, and 0.05% Zn. Pass Rate 2 in Table 11.14 lists the percentage of blanks over the background threshold.

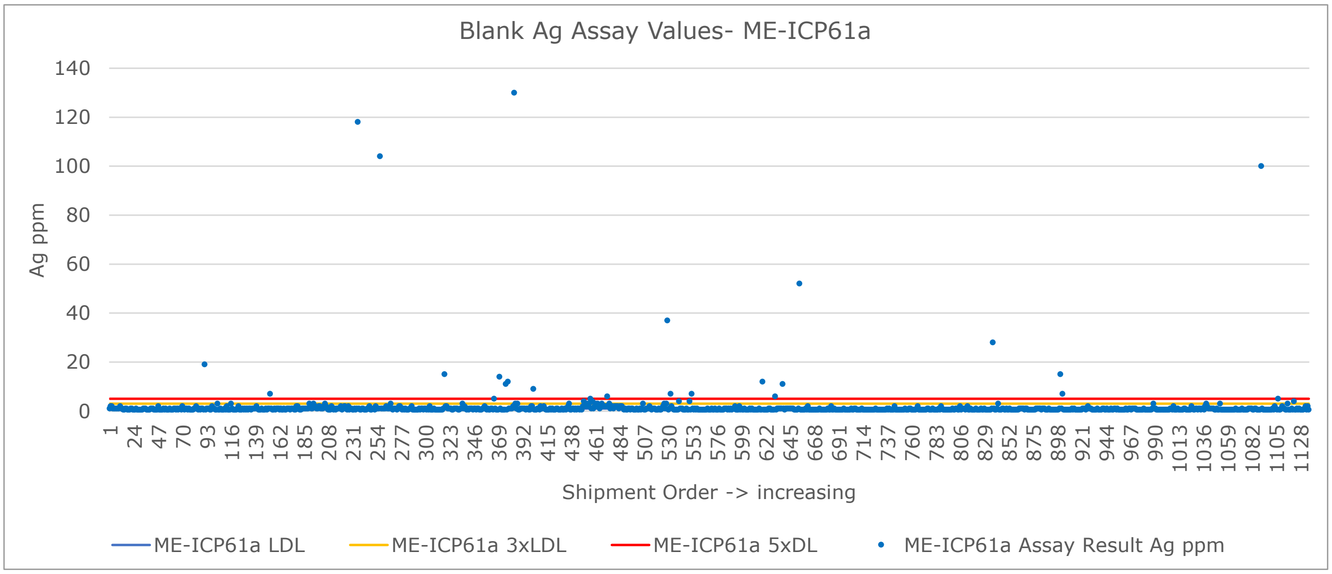
Table 11.14 2004 - 2019 blank statistics using pass / fail parameters

Method	Year	Ag ppm LDL	No. assays	Assays fail (>3*LDL)	Pass rate 1	Pass rate 2
Ag_ME-ICP41_ppm	2004	0.2	10	7	30%	100%
Ag_Ag-AA62b_ppm	2004	1	211	3	99%	100%
Ag_Ag-GRA21_ppm	2005	5	1	1	0%	100%
Ag_ME-ICP61a_ppm	2004, 05, 10	1	1136	30	97%	100%
Ag_ICP40B_ppm	2015, 2017	0.2	138	0	100%	100%
Ag_ME-MS61L_ppm	2019	0.002	36	36	0%	100%
Method	**Year**	**Cu ppm LDL**	**No. assays**	**Assays fail (>3*LDL)**	**Pass rate**	
Cu_ME-ICP41_ppm	2004	1	10	10	0%	60%
Cu_Cu-AA62b_%	2004	10	211	211	0%	99%
Cu_ME-ICP61a_ppm	2004, 05, 10	10	1136	1045	8%	89%
Cu_ICP40B_ppm	2015, 2017	0.5	138	126	9%	95%
Cu_ME-MS61L_ppm	2019	0.02	36	36	0%	97%
Method	**Year**	**Mn ppm LDL**	**No. assays**	**Assays fail (>3*LDL)**	**Pass rate**	
Mn_ME-ICP41_ppm	2004	5	10	10	0%	0%
MnO_Mn-AA62_%	2005	100	1	1	0%	13%
Mn_Mn-AA62b_%	2004, 05	100	212	212	0%	100%
Mn_ME-ICP61a_ppm	2004, 05, 10	10	1136	1136	0%	0%
Mn_ICP40B_ppm	2015, 2017	2	138	138	0%	0%
Mn_ME-MS61L_ppm	2019	0.2	36	36	0%	50%
Method	**Year**	**Zn ppm LDL**	**No. assays**	**Assays fail (>3*LDL)**	**Pass rate**	
Zn_ME-ICP41_ppm	2004	2	10	10	0%	100%
Zn_ME-ICP61a_ppm	2004, 05, 10	20	1136	1046	8%	99%
Zn_ICP40B_ppm	2015, 2017	0.5	138	137	1%	100%
Zn_ME-MS61L_ppm	2019	0.2	36	36	0%	100%

Note: LDL = Lower Detection Limit.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.10 shows the blank performance for Ag from 2004 – 2010 for the ME-ICP61a analytical method, which contains 1,136 sample values.

Figure 11.10 2004 – 2010 Ag blank sample performance ME-ICP61a



Note: Red line is 3x detection limit.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

The following comments are made regarding the performance of blank samples:

- The source of the fluvial sands / gravel used as the blank material is not known. No records are available of any testwork to ensure blank concentrations of Ag, Cu, Mn, and Zn.
- The low blank pass rate for Cu, Mn, and Zn (applying the three times analytical detection) are likely a combination of the use of material that is not completely blank combined with methods with low levels of analytical detection.
- The use of practical detection limits (defined by background populations) shows acceptable blank failure rates for Ag, Cu, and Zn indicating no systematic material contamination occurred during the sample preparation and assaying process.
- Blank material shows high failure rates in Mn. This may be attributable to elevated Mn concentrations within the blank material. No conclusion can be made regarding Mn contamination.

11.5.2.3 Recommendations on blanks

The QP makes the following recommendations for blanks a in future drill programs:

- Procure a commercial blank material source or select a new source for blank material and collect a sufficient bulk sample and submit to a laboratory for homogenization and testing to ensure blank concentrations of Ag, Cu, Mn, and Zn.
- Ensure blank material is inserted at a rate of at least 5%
- Incorporate the use of pulp blanks into future QA/QC programs to facilitate the assessment of contamination during the analytical process.

11.5.3 Duplicate samples

11.5.3.1 Duplicate description

Only field duplicates have been submitted. The RC field duplicates involved an additional split of the original RC sample. There is no description in previous technical reports or company files as to how the DD field duplicates were obtained.

11.5.3.2 Discussion on field duplicates

Field duplicates monitor sampling variance, sample preparation variance, analytical variance, and geological variance.

Duplicate samples should be selected over the entire range of grades seen at the Property to ensure that the geological heterogeneity is understood; however, the majority of duplicate samples should be selected from zones of mineralization. Unmineralized or very low-grade samples should not form a significant portion of duplicate sample programs as analytical results approaching the stated limit of lower detection are commonly inaccurate, and do not provide a meaningful assessment of variance.

Duplicate data can be assessed using a variety of approaches. The QP typically assesses duplicate data using scatter plots and relative paired difference (RPD) plots. These plots measure the absolute difference between a sample and its duplicate. For field duplicates it is desirable to achieve 80 to 85% of the pairs having less than 20% RPD between the original assay and check assay (Stoker 2006). In these analyses, pairs with a mean of less than 15 times the lower limit of analytical detection (LLD) are excluded. Removing these low values ensures that there is no undue influence on the RPD plots due to the higher variance of grades expected near the lower detection limit, where precision becomes poorer (Long et al. 1997).

There has been a variety of analytical methods used over the duration of the project. When reviewing the duplicate data, there appears to be some errors in the data related to the analytical method or units of reporting. This might have an impact on how the duplicates perform. Aftermath and the QP have attempted to remove obviously erroneous data from the results.

Some duplicate samples had insufficient sample material for analysis or either the original or duplicate was not analyzed. These inconsistencies are mainly attributable to the 2004 – 2005 duplicates. Only valid duplicate samples analyzed with the same analytical method have been compared.

The insertion rates for field duplicates are below 5% except for 2010.

Only those elements / analytical methods with greater than 100 duplicate pairs above 15 times the LLD are considered to provide a reliable assessment of duplicate performance.

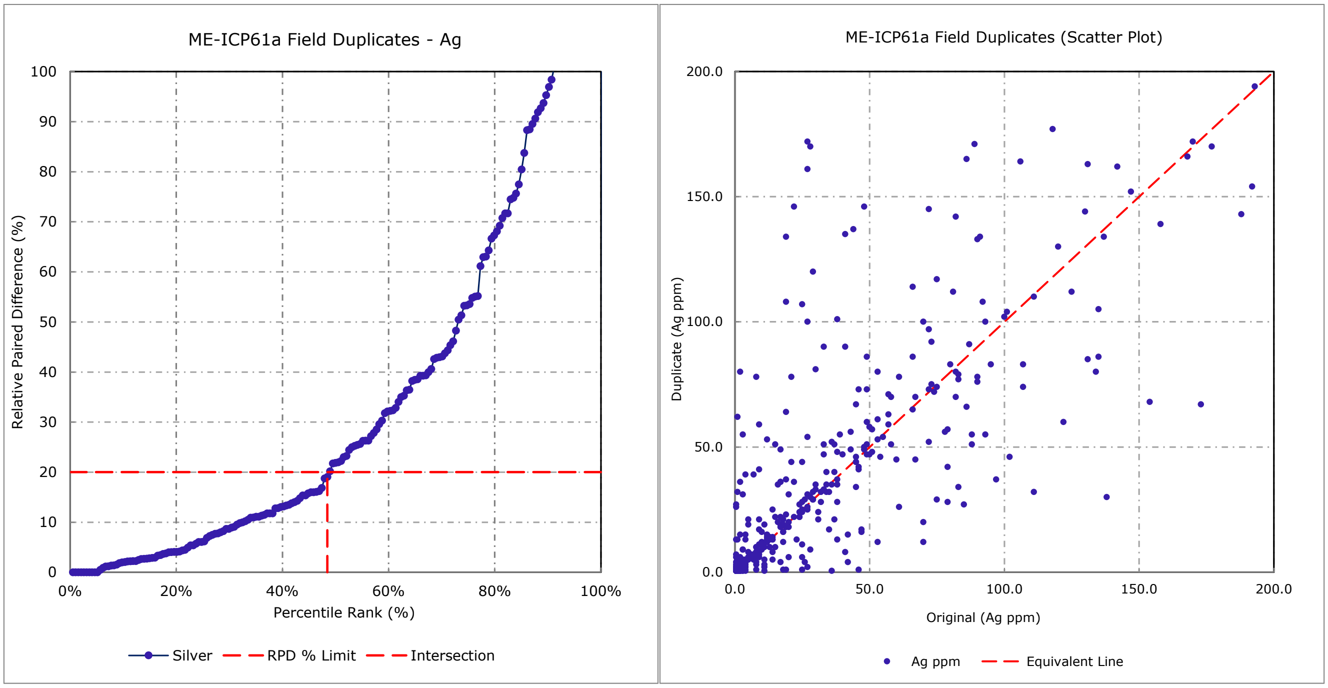
Table 11.15 to Table 11.18 summarize the field duplicate performance for Ag, Cu, Mn, and Zn, respectively. Figure 11.11 to Figure 11.17 show selected RPD and scatterplots for Ag, Cu, Mn, and Zn.

Table 11.15 Summary of Ag field duplicate comparisons

Analytical method	Year	Valid duplicates	Samples > 15xDL	% Samples < 20% RPD	Bias
Ag_Ag-AA62&b_ppm	2004, 05	114	61	66	-5.81%
Ag_Ag-GRA21_ppm	2004	1	N/A	N/A	N/A
Ag_ME-ICP61a_ppm	2004, 05, 10	464	194	48	-11.33%
Ag_ICP40B_ppm	2010, 15, 17	196	125	90	-0.33%
Ag_AAS41B_g/t	2015, 2017	22	11	91	0.31%
Ag_FAG313_g/t	2017	1	N/A	N/A	N/A
Ag_ME-MS61L_ppm	2019	24	15	67	-1.52%

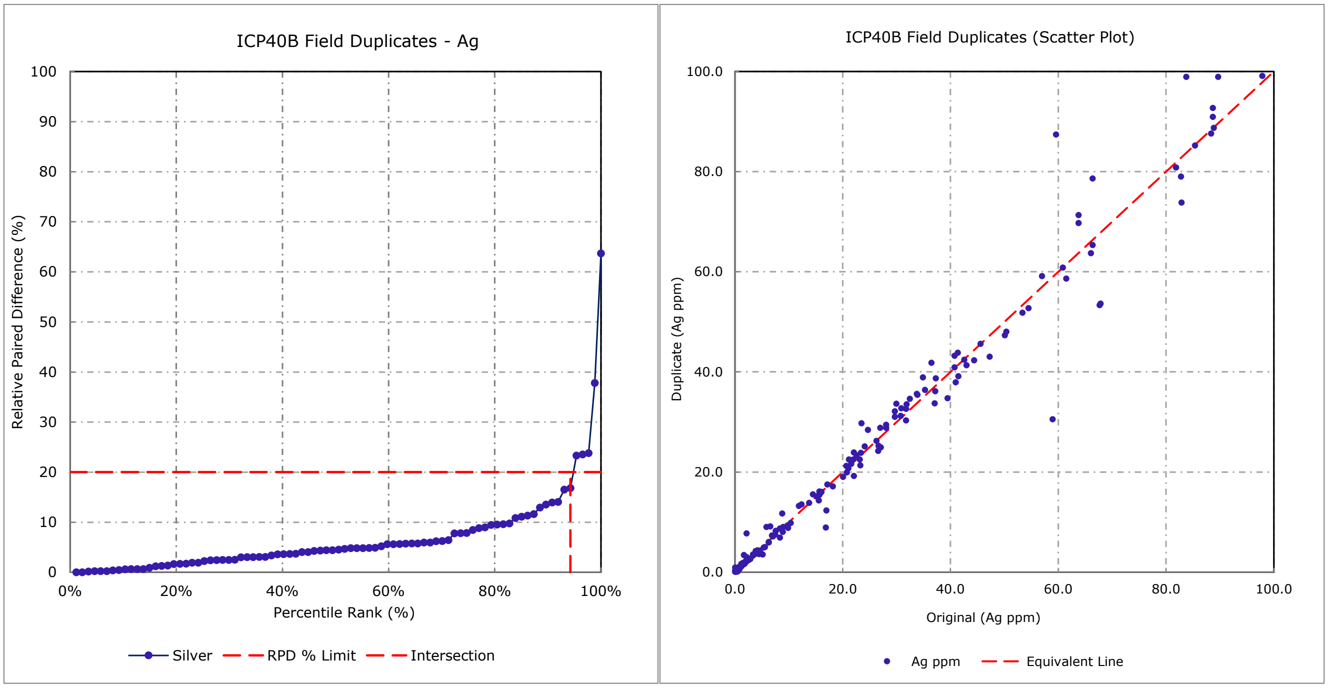
Note: Positive bias indicates higher values in the original assay.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.11 2004 – 2010 Ag_ME-ICP61a duplicate RPD and scatter plot



Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.12 2015 - 2017 Ag_ICP40B duplicate RPD and scatter plot



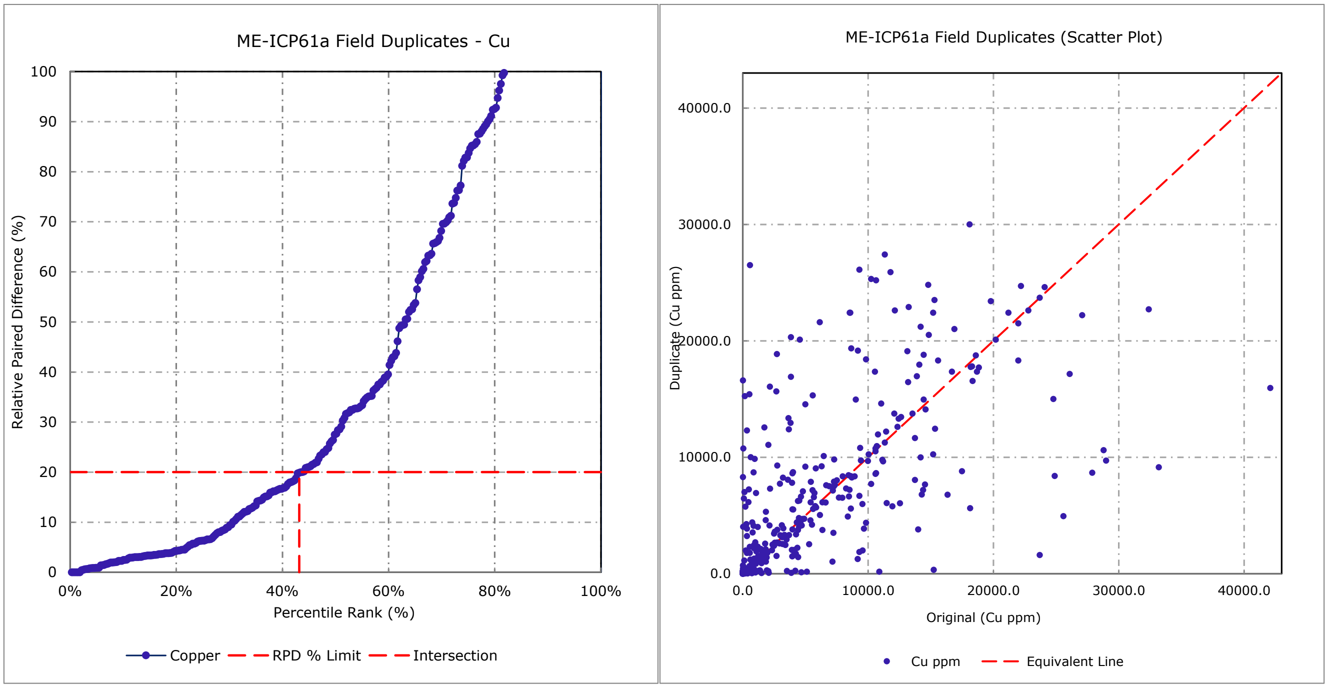
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.16 Summary of Cu field duplicate comparisons

Analytical method	Year	Valid duplicates	Samples > 15xDL	% Samples < 20% RPD	Bias
Cu_Cu-AA62b_%	2004	104	64	55	6.62%
Cu_ME-ICP61a_ppm	2004, 05, 10	507	329	43	-6.05%
Cu_AAS41B_%	2015, 2017	25	25	100	-1.48%
Cu_ICP40B_ppm	2015, 2017	188	183	90	0.30%
Cu_ME-MS61L_ppm	2019	24	24	75	-7.85%

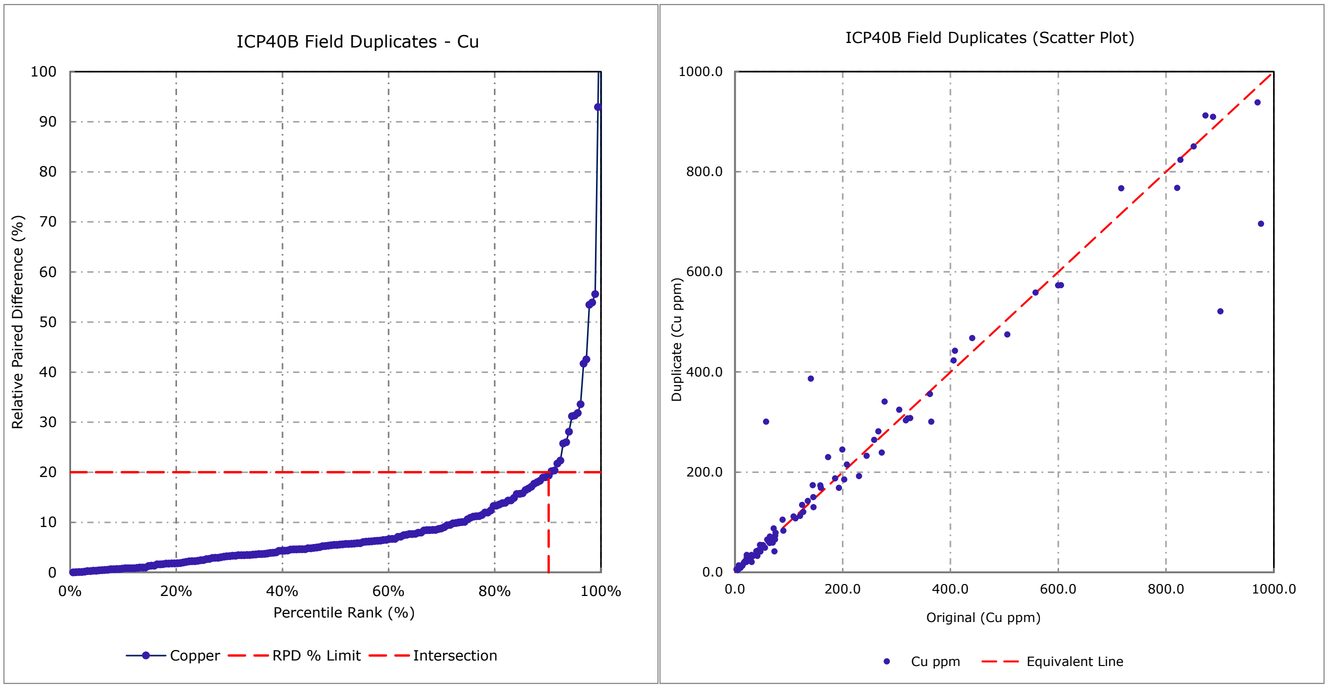
Note: Positive bias indicates higher values in the original assay.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.13 2004 - 2010 Cu_ME-ICP61a duplicate RPD and scatter plot



Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.14 2015 - 2017 Cu_ICP40B duplicate RPD and scatter plot



Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Table 11.17 Summary of Mn field duplicate comparisons

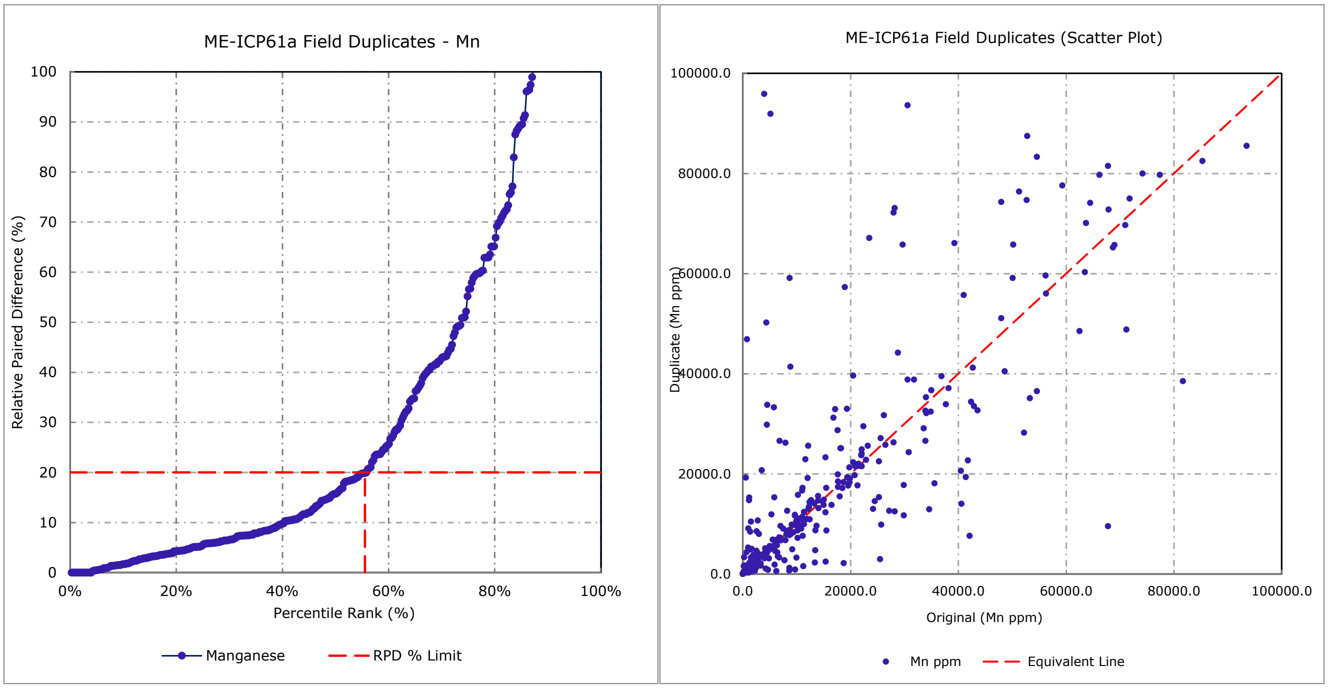
Analytical method	Year	Valid duplicates	Samples > 15xDL	% Samples < 20% RPD	Bias
Mn_Mn-AA62b_%	2004, 05	104	73	66	-9.43%
MnO_Mn-AA62_%	2005	61	61	59	-7.61%
Mn_ME-ICP61a_ppm	2004, 05, 10	399	378	56	-11.92%
Mn_ME-ICP61a_ppm	2010	90	72	86	1.36%
Mn_AAS41B_%	2015, 2017	100	100	95	1.03%
Mn_ICP40B_ppm	2015, 2017	104	104	90	-1.52%
Mn_ME-MS61L_ppm	2019	23	23	87	-14.18%

Notes:

- Positive bias indicates higher values in the original assay.
- The Mn_ME-ICP61a_ppm samples for 2010 are a subset of the data in the row above i.e., 2010 samples are also included in the 2004, 05, 10 row. Results for 2004, 05 alone would be poorer if the 2010 samples were excluded.

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.15 2004 - 2010 Mn_ME-ICP61a duplicate RPD and scatter plot



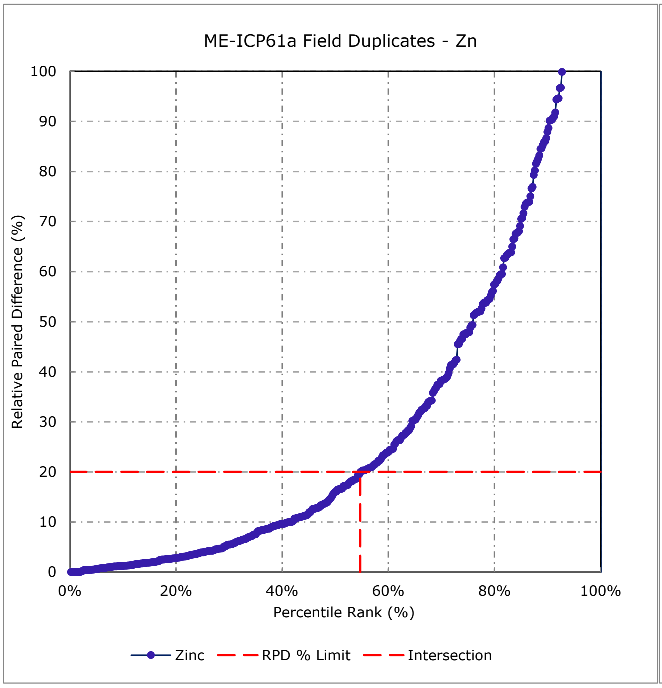
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

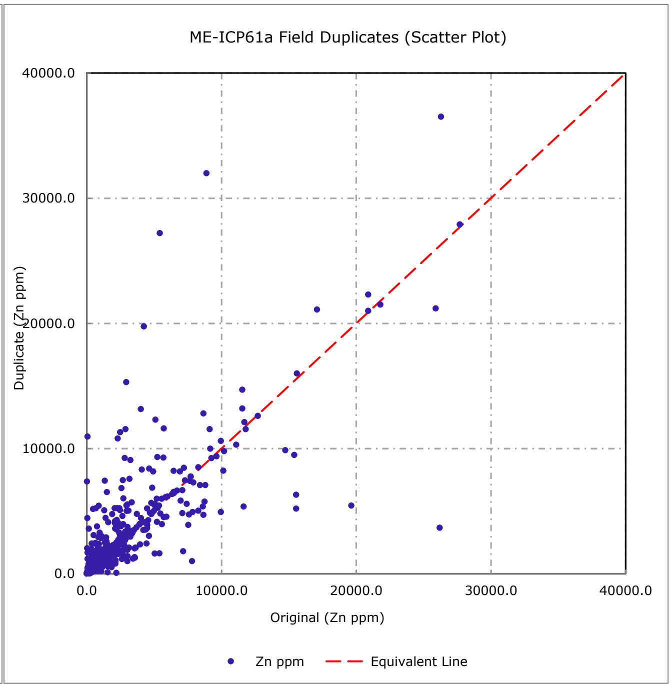
Table 11.18 Summary of Zn field duplicate comparisons

Analytical method	Year	Valid duplicates	Samples > 15xDL	% Samples < 20% RPD	Bias
Zn_ME-ICP61a_ppm	2004, 05, 10	612	468	55	11.19%
Zn_ICP40B_ppm	2015, 2017	213	213	94	0.64%
Zn_AAS41B_%	2017	7	N/A	N/A	N/A
Zn_ME-MS61L_ppm	2019	23	22	87	-5.08%
Zn_Zn-OG62_%	2019	1	N/A	N/A	N/A

Notes: Positive bias indicates higher values in the original assay.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

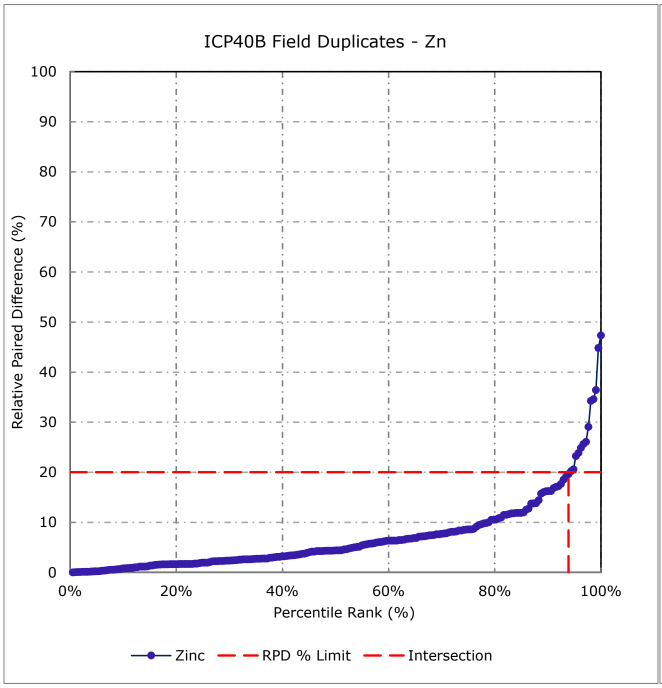
Figure 11.16 2004 - 2010 Zn_ME-ICP61a duplicate RPD and scatter plot

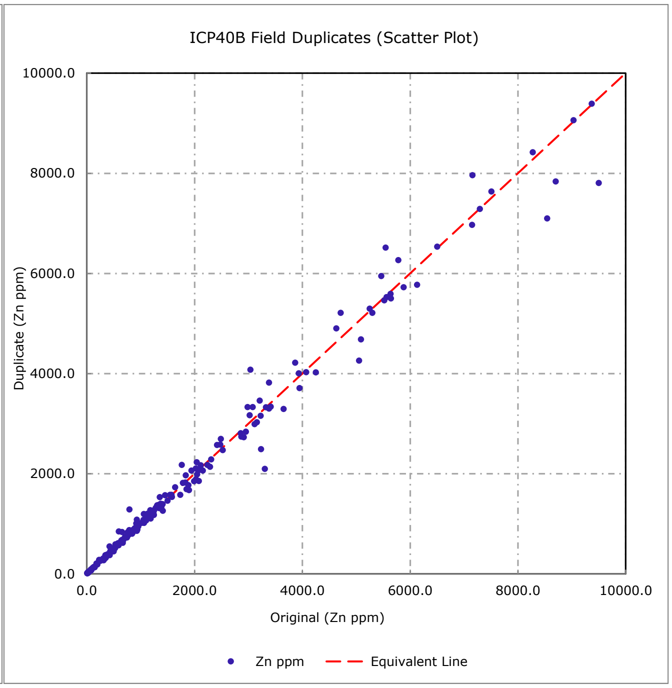




Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.17 2015 - 2017 Zn_ICP40B duplicate RPD and scatter plot





Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Duplicate sample results vary by program. The following comments are made:

11.6 2004 to 2005 program

- Field duplicates collected during the 2004 and 2005 program show sub-optimal performance.
- A number of discrepancies are noted within the 2004 and 2005 duplicate database which suggest possible data entry errors with respect to analytical method and reporting units. This might be negatively influencing the results. This should be investigated by comparing the database to original certificates.
- For Ag, a total of 188 field duplicates from the 2004 and 2005 programs, and 6 from the 2010 program are presented in Tables above. A total of 48% of duplciate samples are less than 20% RPD. Sample duplicates are biased high by between 6 and 11%.
- For Cu, a total of 305 field duplicates from the 2004 and 2005 programs, and 24 from the 2010 programs are presented in Tables above. A total of 43% of duplicate samples are less than 20% RPD for method ME-ICP61a and 55% samples are within 20% RPD for method Cu-AA62B based on 55 samples which is less than optimal. Bias varies dependent on analytical method.
- For Mn, a total of 512 field duplicates from the 2004 and 2005 programs, and 72 samples from 2010 are presented in Tables above. When reviewed by analytical method at total of 56 to 66% of samples are within 20% RPD. Sample duplicates are biased high by between 8 and 12%.
- For Zn, a total of 440 field duplicates from 2004 and 2005, and 28 samples from 2010 are presented in Tables above. A total of 55% of samples are within 20% RPD. Sample duplicates are biased low by 11%.

11.7 2010 program

- Insufficient field duplicates for meaningful analysis.

11.8 2015 program

- Field duplicates results suggest acceptable performance but very small dataset.

11.9 2017 program

- Field duplicates results suggest acceptable performance.

11.10 2019 program

- Field duplicates results suggest acceptable performance but very small dataset.

11.10.1.1 Recommendations for duplicates

Duplicate data should be carefully verfiied against the original assay certificates to ensure that assay units and methods are correctly caputured in the Aftermath database.

The QP makes the following recommendations for duplicates in future drill programs:

- Ensure the insertion rates for duplicates is approximately 5% relative to total number of samples taken.
- Incorporate the use of coarse reject and pulp duplicate samples into the QA/QC program.
- Duplicate samples be selected over the entire range of grades seen on the Project to ensure that the geological heterogeneity is understood. However, most duplicate samples should be selected from zones of mineralization. Unmineralized or very low-grade samples should not form a significant proportion of duplicate sample programs as analytical results approaching

the stated limit of lower of detection are commonly inaccurate, and do not provide meaningful assessment of variance.

11.10.2 Check (umpire) assays

Umpire laboratory duplicates are pulp samples sent to a separate laboratory to assess the accuracy of the primary laboratory (assuming the accuracy of the umpire laboratory). Umpire duplicates also incorporate analytical variance and pulp sub-sampling variance.

11.10.2.1 Check (umpire) assay description

In 2004 and 2005 Silver Standard submitted pulp samples to a second laboratory to confirm assay results. Along with the pulp duplicates, other samples sent to the umpire laboratory included field duplicates, CRMS and blanks. The QP was provided with 559 check assay samples as well as 28 CRM samples and 26 blank samples included in the submission. (Note that the 2005 QA/QC Report states that Silver Standard submitted 1,044 samples to an outside laboratory to confirm assay results including 47 CRMs, 22 field duplicates, and 47 blanks).

Check assays were not submitted to a secondary laboratory for other sampling programs.

11.10.2.2 Discussion on check (umpire) assays

The QP reviewed 559 check assay, 26 blank samples and 28 CRMs samples from the 2004 - 2005 program. The primary laboratory was ALS Lima, the umpire laboratory was Actlabs Lima.

CRMs included with the umpire samples performed poorly with 89% to 100% of CRMs returning results outside of three standard deviations of the expected value. Poor CRM performance is likely the result of inadequate testing of the CRM during certification as discussed in Section 11.5.1. This does not enable meaningful assessment of the check laboratory accuracy.

The performance of the blank samples mirrored that of the primary laboratory. A check of the blanks against background concentrations gave a 100% pass for Ag, 65% pass for Cu, 8% pass for Mn and 97% pass for Zn. Poor blank performance is likely the result of using a blank material containing anomalous Cu, Mn, and Zn. This does not enable meaningful assessment of contamination at the check laboratory.

The QP typically assesses umpire samples using scatter plots and RPD plots. These plots measure the absolute difference between a sample and its duplicate. For umpire samples it is desirable to achieve 80 to 85% of the pairs having less than 10% RPD between the original assay and check assay (Stoker 2006). In these analyses, pairs with a mean of less than 15 times the lower LLD are excluded. Removing these low values ensures that there is no undue influence on the RPD plots due to the higher variance of grades expected near the lower detection limit, where precision becomes poorer (Long et al. 1997).

Umpire samples comprised approximately 6% of 2004 - 2005 samples based on the 2005 QA/QC report. (Note that the database only included 3% umpire samples and that is what is reported in the summary Table 11.3 and Table 11.4). No umpire samples were submitted after 2005.

For Ag, the lower detection limits were different between the laboratories, ALS is 1 ppm Ag, whereas Actlabs was 0.3 ppm Ag. As such, in the review of the check assay program, the ALS lower detection limit is used for comparison. No meaningful assessment of Mn can be made as the check laboratory did not re-analyze samples over 100,000 ppm Mn.

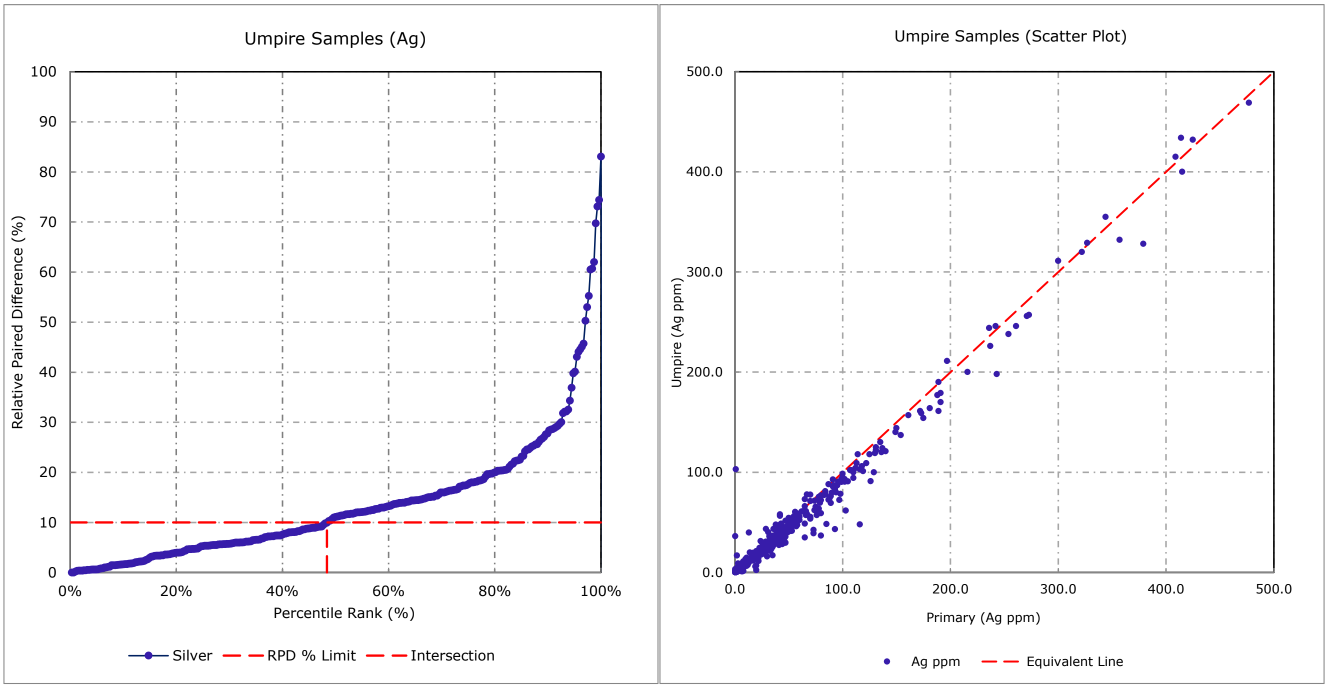
Table 11.19 summarizes the performance of the umpire samples for Ag, Cu, and Zn. Figure 11.18 to Figure 11.20 show the scatter plots and RPD graphs.

Table 11.19 Summary of umpire samples

Element	No. umpire samples	Samples > 15xDL	% Samples < 10% RPD	Bias
Ag	559	308	48	4.20%
Cu	559	437	40	10.75%
Zn	559	495	3	25.39%

Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

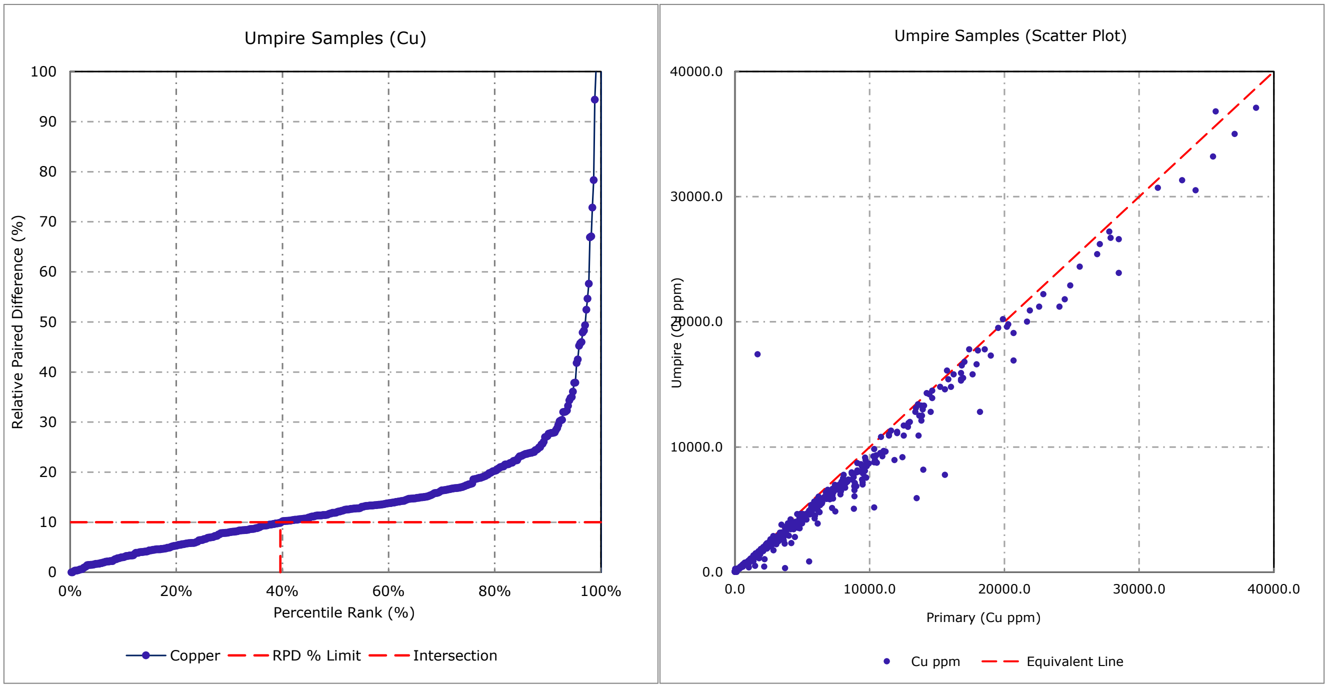
Figure 11.18 2004 - 2005 Ag umpire samples RPD and scatter plot



Notes:
- Scatter plot is limited to 500 ppm – only 9 samples exceed this value.
- Lower Detection Limit = 1 ppm Ag.

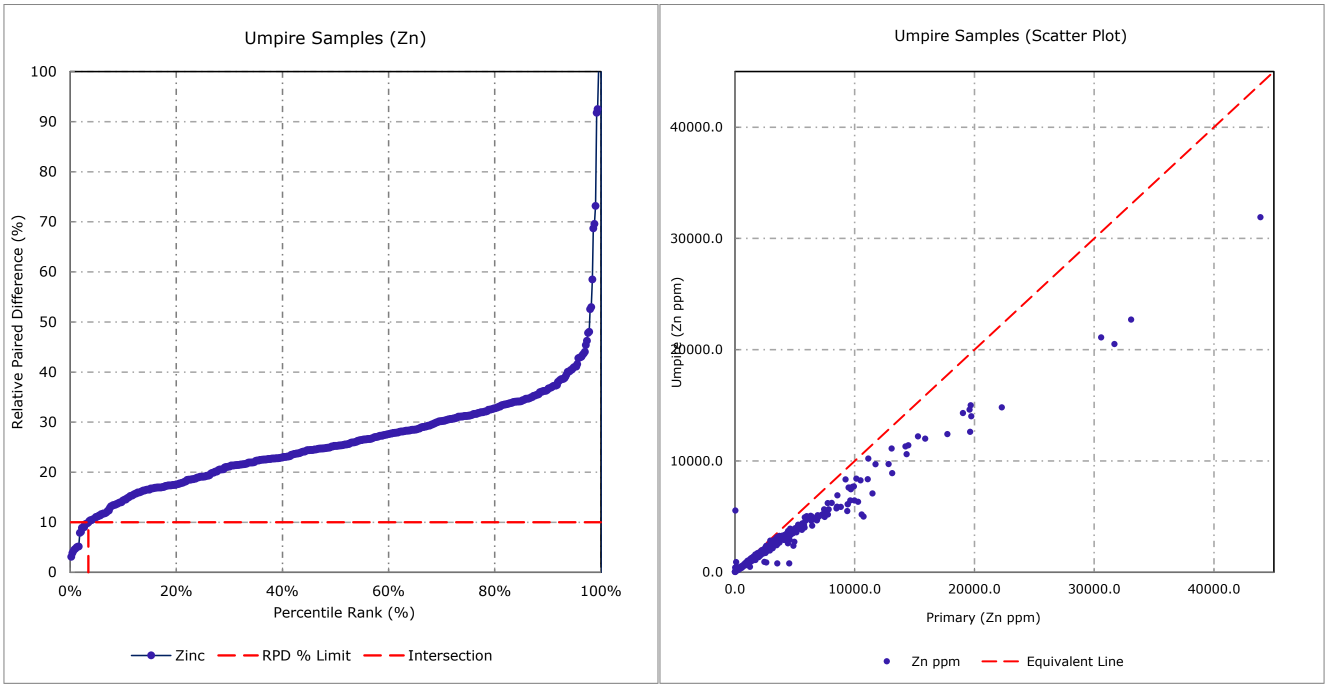
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.19 2004 - 2005 Cu umpire samples RPD and scatter plot



Notes: Lower Detection Limit = 10 ppm Cu.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

Figure 11.20 2004 - 2005 Zn umpire samples RPD and scatter plot



Notes: Lower Detection Limit = 20 ppm Mn.
Source: AMC Mining Consultants (Canada) Ltd. 2021, using data provided by Aftermath.

The performance of the umpire samples is poor. The following issues are highlighted:

- Each element shows a positive bias towards the primary laboratory. Lack of useful CRMs prohibit further assessment of which laboratory has performance issues.
- The bias noted in Zn could possibly be attributed to a difference in analytical method.
- The results of the umpire samples again highlight potential issues with 2004 – 2005 assay program.

11.10.2.3 Recommendations for check (umpire) assays

The QP recommends that if historical pulps are available in the areas of the current Mineral Resource, that additional umpire sampling be completed. Umpire samples should comprise 5% of total samples originally submitted, and include appropriate CRMs and blank materials. The analytical methods used between the primary and umpire laboratory should be analogous and samples should be re-analyzed if they reach the maximum detection limit.

11.11 Conclusions

QA/QC for the 2004 and 2005 programs suggest poor accuracy (poor CRM performance), poor precision (sub-optimal field duplicates) and potential contamination (numerous blank failures). This data is further compromised by drilling and sampling issues discussed in Section 10.

CRM performance in the 2010, 2015, and 2017 programs show acceptable analytical accuracy for Ag, Cu and Zn. CRMs did not monitor Mn during these programs. CRMs used in the 2019 program show acceptable analytical precision in all elements.

Blank material used for all programs generally performed poorly, however show no material systematic contamination occurring during sample preparation and analysis.

With the exception of the 2017 program, field duplicates have not been submitted in sufficient quantities (> 100 samples above 15 x the detection limit) to enable meaningful analysis. For small drill programs this may require a need for a higher insertion rate. Field duplicates included within the 2017 drill program show acceptable performance.

The QP recommends that further investigative work be completed prior to the use of data for Mineral Resource estimations.

11.12 Recommendations regarding historical drilling

Prior to any investigative work or new drilling, the QP recommends:

- Procurement of appropriate CRMs and blanks material.
- Develop comprehensive QA/QC procedures incorporating appropriate insertion rates for CRM, blank, field duplicates, coarse duplicates, and pulp duplicates.

To verify the validity of the 2004 drilling results:

1. Search the historical data for records of poor drilling conditions, poor recovery, contamination, wet samples.
2. Compile recovery information from geological or drilling logs, or sampling weights.
3. Identify drillholes with problematic intervals and remove from future Mineral Resource databases.

4 For drillholes with no apparent sampling issues:

- Complete additional twin drilling on remaining 2004 drilling to assess whether remaining data is reliable. This will enable assessment of 2004 sampling protocols.

For all other drilling programs:

- Complete additional twin drillholes.

For all historical drilling with rejects and pulps available:

- Submit subset of samples to laboratory for analysis.
- CRMs and blank samples and duplicate requests should be included with all submissions.
- Pulp samples will provide assessment of the original laboratory accuracy.
- Precision can be assessed by requesting multiple samples (i.e., duplicates) be taken from coarse reject and pulp materials.
- Duplicate samples of coarse reject material will provide check on whether samples were appropriately homogenized at the time of original processing.
- Duplicate samples of pulps will enable an assessment of pulp homogenization.

12 Data verification

Data verification was carried out in two ways, one being a site based exercise and described in Section 12.1 and the other verification aspects discussed in Sections 12.2 and 12.3 being carried out by or under the supervision of J.M. Shannon P.Geo., of AMC.

12.1 Site verification

12.1.1 Introduction

An inspection of the Property was undertaken by QP, Mr Marcelo Antonio Batelochi, of MB Geologia Ltda, Belo Horizonte / MG, Brazil on 9 – 10 December 2020. He was accompanied by Mr Juan Carlos Fernandez, a consultant to Aftermath, and Eng. Jaime Ortiz of Silver Standard. The scope of the visit covered the geology, data collection, and sampling aspects of the Property including inspections of drill core and old drill sites. In addition, in the Chorrillos storage building in the metropolitan zone of Lima, RC drilling chips, coarse, and pulp rejects were inspected on the 12 December 2021.

The results of the inspection are provided in a report titled “Field Visit Report 8th – 12th Dec 2020 on the Berenguela Project,” Department of Puno Peru, by Mr Batelochi, December 2020, and the comments are summarized here.

The general scope of this work was to verify and validate the field information from historical exploration campaigns in preparation for exploration programs and a later estimation of Mineral Resources.

12.1.2 On site information checking

The objective of the site visit was to check geology, exploration, and drilling. The field work was focused on the observation of the project infrastructure, the cores, and chips of the drillholes, outcrops, drill pads, and collar markers, as well as discussions on drilling techniques and exploration procedures. To fulfill the proposed work, the following specific objectives were carried out:

- GPS verification of the different exploration campaigns regarding drill collars with photographs evidencing the location of these in the field.
- Take notes and photographs of outcrop geology.
- Review diamond drilling cores and RC cutting of previously mineralized selected sections (intersection with mineralized veins) as selected by the QP.
- Verification and validation of storage sites for diamond drilling cores and RC cuttings and the corresponding safety and quality of the storage sites.

As the last drilling was in 2019 no active data collection could be reviewed.

12.1.3 Exploration campaigns verification and validation

Two types of drilling were identified and have been carried out mainly by Silver Standard (between 2004 and 2015), by Valor in 2017, and by Rio Tinto in 2019. A total of 291 RC drillholes and 32 DD drillholes were completed over the period 2004 to 2019. These are quantified in Table 10.1.

12.1.4 Control points taken

Around 20% of the old drill pads were visited, at which 15% of the collar markers were located. The collar markers were removed for the drillholes from 2010 until now, including the holes 2019 by Rio Tinto, as part of an environmental reclamation activity carried out by the Silver Standard team. However, where this work had been carried out and the collars markers removed, it was possible to follow the accesses and identify the pads within the re-vegetated areas. Examples of the collar markers are shown in Figure 12.1.

Figure 12.1 Examples of drillhole collar markers

Source: MB Geologica Ltda.

The collar locations from the hand-held GPS show that the database coordinates are acceptable, showing a difference of <10 m in most instances in both the horizontal and vertical directions as seen in Table 12.1.

Table 12.1 Hand GPS drillhole collar location check

Hole-ID	Original X	Original Y	Original Z	Hand-held GPS X	Hand-held GPS Y	Hand-held GPS Z	Horizontal distance	Vertical distance
BED-001	331,415.335	8,268,242.930	4,197.200	331,419.5	8,268,239.1	4,206.4	5.7	9.2
BER-009	332,107.815	8,268,153.979	4,249.462	332,114.0	8,268,149.6	4,254.6	7.5	5.1
BER-010	332,108.668	8,268,147.028	4,249.611	332,113.4	8,268,143.1	4,254.3	6.1	4.7
BER-011	332,109.063	8,268,150.043	4,249.568	332,113.3	8,268,145.4	4,254.7	6.3	5.2
BER-014	332,054.997	8,268,159.664	4,246.699	332,060.4	8,268,153.3	4,248.5	8.3	1.8
BER-014	332,054.997	8,268,159.664	4,246.699	332,061.4	8,268,155.7	4,249.7	7.5	3.0
BER-015	332,054.034	8,268,156.732	4,246.609	332,060.4	8,268,153.5	4,248.5	7.2	1.9
BER-015	332,054.034	8,268,156.732	4,246.609	332,061.0	8,268,151.3	4,248.4	8.8	1.8
BER-018	332,007.334	8,268,162.631	4,246.990	332,012.5	8,268,159.2	4,250.2	6.2	3.2
BER-019	332,013.134	8,268,157.031	4,246.568	332,019.3	8,268,152.5	4,250.8	7.6	4.2
BER-020	332,011.871	8,268,212.398	4,251.921	332,020.0	8,268,207.6	4,244.0	9.5	7.9
BER-021	332,012.273	8,268,210.311	4,251.834	332,017.9	8,268,205.6	4,242.5	7.3	9.3
BER-022	332,011.089	8,268,209.411	4,251.936	332,018.9	8,268,203.3	4,244.5	9.9	7.4
BER-026	332,109.575	8,268,211.179	4,252.188	332,115.7	8,268,205.3	4,257.4	8.5	5.2
BER-027	332,109.675	8,268,208.779	4,252.155	332,115.3	8,268,203.3	4,256.7	7.8	4.5
BER-042	331,516.762	8,268,264.804	4,214.702	331,522.1	8,268,259.1	4,223.4	7.8	8.7
BER-043	331,516.662	8,268,266.904	4,214.650	331,522.4	8,268,261.4	4,223.4	8.0	8.8
BER-044	331,518.862	8,268,274.104	4,214.503	331,525.1	8,268,266.9	4,223.3	9.6	8.8
BER-049	331,568.400	8,268,321.762	4,217.851	331,576.7	8,268,316.0	4,225.0	10.1	7.1
BER-049	331,568.400	8,268,321.762	4,217.851	331,576.5	8,268,319.0	4,224.4	8.6	6.6
BER-050	331,568.800	8,268,318.962	4,217.792	331,577.4	8,268,313.5	4,224.7	10.2	7.0
BER-051	331,562.100	8,268,265.763	4,218.073	331,569.5	8,268,260.5	4,225.6	9.1	7.5
BER-052	331,562.000	8,268,262.963	4,218.078	331,567.9	8,268,257.3	4,225.2	8.2	7.1
BER-053	331,561.400	8,268,261.063	4,218.061	331,565.7	8,268,254.1	4,224.6	8.1	6.5
BER-054	331,512.666	8,268,223.526	4,212.627	331,519.1	8,268,219.3	4,220.4	7.7	7.7
BER-055	331,513.287	8,268,220.180	4,212.327	331,519.9	8,268,215.2	4,220.6	8.3	8.3
BER-056	331,461.803	8,268,230.925	4,205.660	331,470.0	8,268,225.2	4,215.2	10.0	9.5
BER-057	331,461.022	8,268,227.754	4,205.559	331,467.5	8,268,221.7	4,214.4	8.9	8.9
BER-073	331,390.982	8,268,278.959	4,181.679	331,397.0	8,268,272.7	4,193.5	8.7	11.8
BER-074	331,390.482	8,268,281.659	4,181.665	331,395.9	8,268,276.1	4,192.4	7.7	10.8
BER-076	331,359.783	8,268,239.259	4,175.656	331,365.6	8,268,234.6	4,187.8	7.5	12.2
BER-081	331,422.282	8,268,272.059	4,194.215	331,430.4	8,268,276.3	4,204.0	9.1	9.8
BER-087	331,669.461	8,268,305.400	4,210.792	331,675.7	8,268,300.7	4,216.6	7.9	5.8
BER-088	331,670.763	8,268,306.516	4,210.887	331,677.1	8,268,299.3	4,217.3	9.6	6.4
BER-089	331,627.193	8,268,306.378	4,214.974	331,636.0	8,268,299.6	4,222.0	11.1	7.0
BER-090	331,627.520	8,268,310.407	4,215.013	331,634.5	8,268,305.4	4,222.1	8.6	7.1
BER-104	331,850.217	8,268,183.511	4,238.721	331,857.2	8,268,179.8	4,240.7	7.9	1.9
BER-105	331,857.972	8,268,177.882	4,238.626	331,863.8	8,268,173.9	4,239.9	7.0	1.3
BER-107	331,899.916	8,268,127.281	4,234.489	331,906.9	8,268,121.9	4,236.8	8.8	2.3
BER-108	331,950.415	8,268,112.581	4,234.776	331,956.2	8,268,108.2	4,239.2	7.3	4.5
BER-109	331,960.515	8,268,117.681	4,235.178	331,967.8	8,268,112.5	4,240.2	8.9	5.0
BER-110	331,997.414	8,268,110.281	4,239.139	332,006.1	8,268,115.8	4,245.3	10.3	6.1
BER-119	331,911.860	8,268,203.736	4,249.628	331,920.3	8,268,197.5	4,247.4	10.5	2.3
BER-120	331,912.860	8,268,199.936	4,249.022	331,918.7	8,268,200.2	4,248.9	5.8	0.1
BER-127	331,963.760	8,268,215.936	4,250.609	331,970.6	8,268,212.4	4,246.4	7.7	4.2
BER-146	332,166.257	8,268,198.436	4,251.094	332,172.6	8,268,193.3	4,257.0	8.1	5.9
BER-149	332,167.957	8,268,198.836	4,250.811	332,174.5	8,268,193.4	4,257.0	8.6	6.2

Source: MB Geologica Ltda.

As the drillhole collars were located using PSAD-56 datum and transformed mathematically into WGS-84 datum (WGS 84), a resurvey of 20% of the existing collar markers to confirm the correct location using the WGS 84 is recommended. If Aftermath wanted to confirm the collar location of holes whose marker had been damaged it is a viable task to find these as the location is recognizable despite the reclamation. It would require some shallow excavation after location of a reference point based on the database coordinates.

12.1.5 Geological verification

Geology and mineralization were seen in the core and in the field outcrops during the one day visit to site. The observation in the field corroborates what has been written in the old reports. In the interest of continuing to improve the geological understanding of the deposit, and as discussed with Geologist Juan Carlos, additional detailed mapping of lithology, structural, alteration, and mineralization is recommended. In addition, a re-logging campaign is recommended for all cores and chips to make the codes and description criteria compatible, as well as part of a continuous improvement acquiring the additional and more detailed information. This consistent terminology should be also used in the mapping mentioned above.

12.1.6 Drill core verification

Core from DD holes and chips from RC were checked during the field visit and at Chorrillos.

DD cores viewed:

- BED-001; BED-003A; BED-003; BED-008 by Silver Standard in 2010
- 19BERE0002; 19BERE0003; 19BERE0004 by Rio Tinto in 2019

RC Chip boxes viewed:

- BER-004; BER-018; BER-027; BER-115; BER-140; BER-142; BER-184; BER-189; BER-191; BER-194; BER-203; BER-213

The cores from DD and the chips from RC are in good condition and reasonably well preserved. It is evident that the core drilled by Rio Tinto is in much better condition than the older core. This may be partly due to age and partly due to drilling techniques used at the time.

The intersection seen in core and chips was compared to the logging and the assays of Cu %, Ag g/t, and Mn % in the database. In general, the grades and visual inspections do not match in less than 5% of the cases Figure 12.2 shows core from drillhole BED-003 which has a mineralized interval from 30.30 to 54.7 (24.4 m) @ 170 Ag g/t, 11.8 Mn, %.0.87 Cu %,0.90 Zn %.

Figure 12.2 Cores from BED-003 showing a mineralized interval

Source: MB Geologica Ltda.

The RC chips are stored in chip trays such as seen in Figure 12.3. This hole, BER-004, had mineralized intervals as follows:

- 3.0 m to 9.0 m (6 m) @ 56 g/t Ag, 6.3 % Mn, 1.46% Cu, 0.25% Zn
- 12.0 m to 23.0 m (11 m) @ 117 g/t Ag, 18.3 % Mn, 1.18% Cu, 0.56% Zn
- 39.0 m to 45.0 m (6 m) @ 109 g/t Ag, 7.3 % Mn, 1.11% Cu, 0.58% Zn
- 74.0 m to 83.0 m (9 m) @ 45 g/t Ag, 16.7 % Mn, 1.51% Cu, , 0.33% Zn

Of note are the missing chips which correspond to sample return issues and thus no assays. This could be due to clay layers.

Figure 12.3 RC chips from BER-004

Source: MB Geologica Ltda.

12.1.7 Sample storage

All core and pulps from any core drilling are stored close to site at what are called the Limon Verde facilities, which are 1 km from Santa Lucía and 5 km from the deposit. These consist of two warehouses which were part of the old mine infrastructure. Here there is a core shack, office, logging area, and storage of the diamond hole cores. This facility is adequate for any new programs going forward.

Both facilities are secure, and the core shack area is fenced with a locked gate. The area has been maintained by Silver Standard. The environmental group who has been working at site are responsible for the core shed security.

Figure 12.4 Limon Verde coreshack facilites

Source: MB Geologica Ltda.

In Chorrillos, in the metropolitan zone of Lima, there is a warehouse where RC drilling chips, coarse, and pulp rejects are stored. These are not that well inventoried or organized (Figure 12.4). It is recommended that before re-starting the exploration program, a more spacious place is rented so that it is possible to make an inventory of the existing material and organize it.

Figure 12.5 Chorrillos storage facilites

Source: MB Geologica Ltda.

12.1.8 Conclusions from the field inspection

The verification and validation carried out in the field confirm that all exploration campaigns were carried out as reported.

Due to no current exploration activity, the field inspection was focused on the observation of the project infrastructure, the cores and chips from drilling, outcrops, drill pads, and collars markers, as well as discussions on drilling techniques and exploration procedures, as discussed below:

- The core boxes, coarse, and pulp rejects and other material from the project were stocked at two locations. The materials are in good conditions, very well preserved, but not organized. Aftermath must make an inventory and organize the two warehouses and find more spacious warehousing in Chorrillos.
- Geology and mineralization were seen in the cores and in the field outcrops. The observation in the field corroborates what has been written up. However, for consistent recording by Aftermath and as discussed on site, a consistent terminology in terms of detailed mapping of lithology, structural, alteration, and mineralization is required. This should include a relogging program, establishing consistent codes which are used throughout the site.
- It is recommended that the first phase of re-starting the exploration programs be a diamond drilling campaign to build up the knowledge of the deposit geology and acquiring data from samples that provide enough information for a geometallurgy characterization. It is suggested that RC drilling is done as a follow up and infill assuming there has been a calibration of both methods.
- Around 20% of the drill pads were visited, in which 15% of collars markers were located. The collar location from the hand-held GPS shows that the database coordinates are acceptable. It is recommended to survey 20% of the existing collars tags with a DGPS to confirm the correct location using WGS 84 and compare the coordinates from the database values that was located using PSAD-56 and transformed mathematically into WGS-84.
- Collar markers have been destroyed due to land rehabilitation for the holes drilled since 2010. It is noted that it is possible to re-establish these markers.
- The cores from DD and the chips from RC are safely stored and in good condition. The drillhole database was compared to core for a number of intersections. A re-logging campaign is recommended for all cores and chips to make the codes and description criteria compatible, as an opportunity for continuous improvement acquiring additional and more detailed information.
- Bulk density sampling procedures were not seen during the site visit due to the project being dormant. It is recommended when the project re-starts, a continuation collection of bulk density measurements occurs.

12.2 Database verification

Aftermath rebuilt the database from first principals from a collection of spreadsheets and raw data and carried out their internal checks. Under the supervision of the QP, Ms Dinara Nussipakynova of AMC received the database and ran validations and plotted out the drillholes. A number of issues were seen. It was found that drillhole collars do not fit the topography file provided, and there were a number of duplicate intervals found in the collar file. These have been brought to the attention of the Issuer. It is recognized that there is considerable work to be done to ensure that the database is suitable for any Mineral Resource estimation.

12.3 Assay verification exercise

A random selection of drillholes in the database was made by the QP, and Ms M. Clendenning of AMC compared the original assay results on the assay certificates to those in the database. This selection spanned all the drilling campaigns and assay laboratories used. This verification consisted of comparing 3,574 of the 30,848 assay results in the database, to those in the certificates which is approximately 12% of the total samples. One set of values for one sample was not verifiable as the certificate number for a third certificate was not flagged in the database for drillhole BER-063. This was brought to the attention of the Issuer.

12.4 Conclusion

The QPs for this section are of the opinion at this time, that the exploration data requires considerable validation prior to being used for estimation purposes. As this data has only recently been acquired by the Issuer this is an ongoing process. The assay verification showed no errors.

13 Mineral processing and metallurgical testing

This discussion is in regard to the historical testwork carried out on the Property.

13.1 Introduction

Investigations into extraction of copper and silver from Berenguela ore commenced in the early 1900's. Ownership has changed a number of times with various metallurgical processes tested as summarized below:

- 1905 to 1965: Lampa Mining Company processed ore via direct smelt to produce Cu-Ag matte. When Cu grades reduced, Lamp Mining progressed pilot scale trials using segregation roasting to produce a Cu-Ag concentrate for market.
- 1960's & 70's: ASARCO, Cerra de Pasco Corporation and Charter Mining pursued segregation roasting followed by flotation to recover Cu and Ag concentrate.
- 1995 to 1999: KCA focused on hydrometallurgical processes to take advantage of the Mn market for specialty Mn products. A reductive acid leach using SO2 showed promising results for Cu, Ag, and Mn extraction. Upgrading of the ore using wet high intensity magnetic separation was trialled but it resulted in poor recoveries.
- 2003 to 2016: Silver Standard pursued reductive acid leach, segregation roasting and other options to upgrade the ore feed specification including wet high intensity magnetic separation (WHIMS) and controlled potential sulphidation (CPS) flotation. KCA, XPS Consulting & Testwork Services (XPS), and Process Research Associates (PRA) were commissioned for various phases of testwork.
- 2016 to 2018: Valor pursued the reductive acid leach process and trialled alternative reductants using both Minero Prospero and Fremantle Metallurgy (FreoMet). To upgrade the feed specification and reject acid consumers (carbonates) and silica, various methods were explored including fine grinding, heavy media separation and WHIMS without success. Some success was reported using dry high intensity magnetic separation (HIMS).

Key flowsheets that have been pursued during the course of historical testwork for the Berenguela project include the following four sequential processes:

- Pelletized ore - segregation roast @ 750°C - flotation - ship concentrate, with no Mn recovery.
- Ore - roast - calcine CPS flotation - ship conc with no Mn recovery.
- Ore - pre-leach - reductive acid leach - Cu electrowinning (EW), Zn precipitation, Mn EW, and / or production of $MnSO_4$ - Ag cyanide leach to dore.
- Ore - HIMS (in or out) - reductive acid leach - Cu EW, Zn precipitation, Mn EW, and / or production of $MnSO_4$ - Ag cyanide leach to dore.

Given the favourable market for manganese due to the expanding battery market, this testwork summary focuses on the hydrometallurgical approach that includes Mn recovery.

13.2 Sample selection

Valor (2018) provided a summary of testwork phases along with sample source, as presented in Table 13.1. Unfortunately, the sample detail is very scant and should be a major focus for the next phase of project development.

According to KCA (2010), Lampa Mining Co. extracted approximately 500 kt of ore from the Berenguela mine from 1906 to 1965 to recover Cu and Ag. Subsequently, ASARCO and Chartered Consolidated explored the property and drilled 52 holes from 1965 to 1966. ASARCO took a 268 tonne bulk sample that represented the different ore types according to ASARCO ore domain classifications (Table 13.5). The ore domain classifications are not included in the resource block model and as such the volumetric meaning is not understood.

KCA acquired the property in 1995 and conducted a bulk sampling program at 25 locations that comprised 214 separate samples. This was the sample processed at KCA's laboratories during 1995 to 1999 period and later used for KCA 2010 to 2011 campaigns.

Silver Standard reported that a RC drilling campaign was conducted to generate metallurgical samples, as presented in Figure 13.1. Samples were nominated according to ASARCO ore domain classifications and used for the PRA (2006) hydrometallurgical and various segregation roasting (Section 12) testwork campaigns. These samples along with other drill core are now located at Freomet laboratory and are available for future testwork.

Further work is required to locate samples within the resource and trace back to testwork programs.

Table 13.1 Valor – summary of testwork phases

Process	Operator	Year	Notes	Samples
Segregation roasting	Lampa Mining Co.	1960	Pilot plant 1 tpd at Limon Verde and laboratory testwork. Segrn / flotation	Bulk ROM
	Cerro de Pasco Corp.	1968	Direct flotation tests	1
			Segregation / flotation tests Manganese recovery by leaching	2
	Charter Consolidated	1969	Torco – pilot plant 10 tpd (seg / flotn)	Bulk ROM
	Minero Peru	1980	USBM – bench and pilot plant tests	7
		1985	INGEMMET / JICA – seg / flotn	4
		1989	INGEMMET – magnetic Mn recovery	2
	SSRM	2014	XPS – pelletized segregation roasting	18
		2015	SGS – roasting to recover silver	1 composite
		2016	KPM – pelletized segreg. Roasting	1 composite
Reductive acid leach	KCA	1995-99	Samples collected from tunnels, waste dumps, stockpiles, and outcrop. Used to prepare composites.	214
	SSRM	2006	PRA carious tests including baseline sulphuric acid leaching, cyanide leaching, magnetics, POX, SO_2 reduction, and flotation of residues.	4 composites
	KCA	2010-11	Testwork to validate reduction leach flowsheet, and parameters therein. Bulk composites prepared from 1995 suite.	2 composites
	Valor	2017-19	Chapi & Certimen (flotation)	Various
			Prospero Mineração	1 composite
			Fremantle Metallurgy	1 composite

Source: Valor 2018.

13.3 Mineralogy

Berenguela mineralogy is complex and is characterized by:

- Cu, Zn, and Ag sulphides typically occur as ultra-fine particles disseminated and encapsulated by the manganese matrix, containing copper oxide minerals at surface with chalcopyrite, chalcocite, sphalerite, and argentite below the oxidized zone.
- Complex manganese minerals and matrix comprising major psilomelane with lesser pyrolusite.
- Argentite associated with alabandite, psilomelane, pyrosulite, minor clays - ultra-fine (<10 micron) or in solid solution. Minor fine silver.

- Low porosity Mn minerals with poor liberation of Cu and Ag species.
- Potential non-refractory Ag minerals in fine clays. The extent of which has not been established.
- Limited mineralogy on Cu species and no mineralogy on Zn and Co species.
- Large variability in Mn, Ag, and Cu grades across resource.
- QEMSCAN was not able to identify individual species due to ultra-fine disseminated particles.

Table 13.2 Summary of Berenguela Minerals

Mineral	**Formula**	**Mineral**	**Formula**
Psilomelane	$Mn_5O_{10}.2H_2O$	Jarosite (Jt)	$KFe_3(SO_4)_2(OH)_6$
Pyrolusite	MnO_2	Chalcopyrite	$CuFeS_2$
Alabandite	MnS	Chalcocite	Cu_2S
Chalcophanite	$(Zn,Fe,Mn)Mn_3O_7.3H_2O$	Chrysocolla	$CuSiO_3.2H_2O$
Cryptomelane	$KMn^{4+}{}_6Mn^{2+}{}_2O_{16}$	Malachite	$Cu_2Co_3(OH)_2$
Neotocite	$(Mn,Fe)SiO_3.H_2O$	Azurite	$Cu_3(CO_3)_2(OH)_2$
Rhodochrosite	$MnCO_3$	Argentite (acanthite)	Ag_2S
Goethite (Go)	FeO.OH	Sphalerite	ZnS
Hematite (Ht)	Fe_2O_3	Pyrite	FeS_2
Mineral mixtures			
Limonite (FeOx)	Hydrated amorphous mixture Go+Jt+Ht	Manganese wad	Amorphous mixture MnOx & FeOx

Source: Valor 2018, PFS Report Section 6 draft.

13.3.1 Gangue mineralogy

Gangue mineralogy is characterized by the following, and has the listed process impacts:

- 50 - 60% is dolomite ($CaMg(CO_3)_2$) – characteristic peak in XRD.
  - Acid consumer.
  - Causes sulphate precipitates.
  - Reduces liquid solid separation (LSS) performance.
- 10 - 20% calcite ($CaCO_3$), microcline ($KAlSi_3O_8$) and quartz (SiO_2).
- Trace clays kaolinite and sericite.
- Siliceous jasperoid and chalcedony:
  - Colloidal silica in leach solutions reduces LSS performance (KCA added pre-leach to reduce LSS effect).
- Other – strontianite carbonate ($SrCO_3$), barite ($BaSO_4$).

13.4 Ore characterization

Limited comminution testwork has been conducted. A single sample's Bond ball mill work index and abrasion index has been measured, as per Table 13.2. The ore is soft and not abrasive as the mineralogy also suggests.

Table 13.3 Comminution testwork results

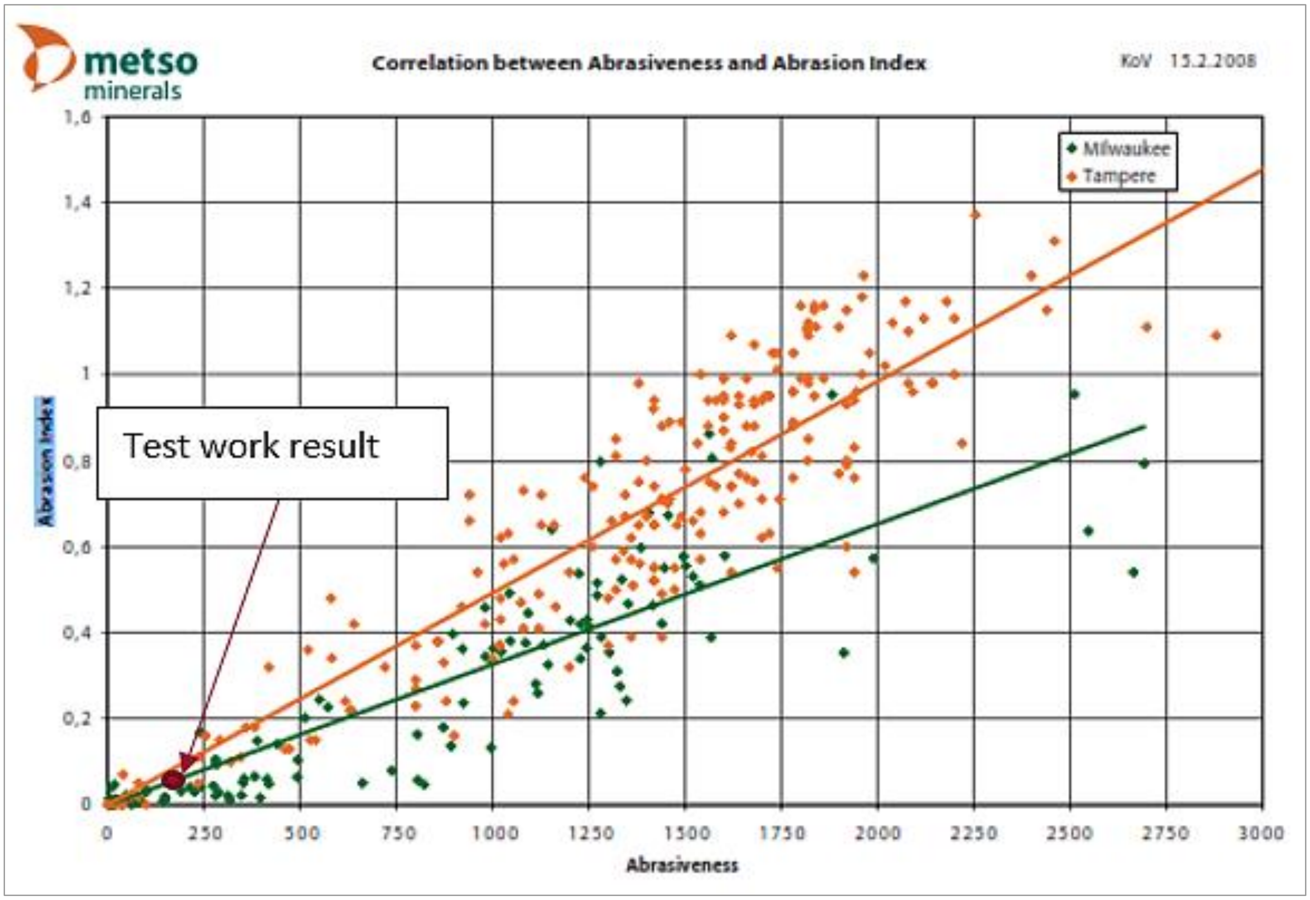
Parameter	Unit	Value	Laboratory
Bond ball work index, BWi	kWh/t	8.39	Certimin[1]
Abrasion index, MAi	g/t	144	Metso[2]
Crushability index	%	57.9	Metso
SG – Brown	t/m^3	3.64	Silver Standard[3]
SG – Massive	t/m^3	3.03	Silver Standard
SG - Underground	t/m^3	2.63	Silver Standard
SG - Yellow	t/m^3	2.58	Silver Standard

Notes:
[1] Reporte Metalurgico Bond work index, Certimin 20170628 COT SM 0096 00 17_CERTIMIN.
[2] Abrasion and Friability, Metso 20180220-31-SOMI.
[3] Berenguela Metallurgical Testwork prepared for Silver Standard Resources Inc, PRA 20060131 0404005.

The ore is predominantly soft and friable. The abrasiveness of the ore will vary with silica content. High wear rates and potentially high circulating loads in comminution circuit would be a function of quantity and type of silica in the ore. High SG components will build up in the circulating load and grind to a commensurately finer P_{80}.

Very limited testwork has been identified to support comminution circuit design. Work by Certimin and Metso is illustrated in Figure 13.1. Presumably the MAi index from Metso is a Milwaukee index and indicates that the ore is very low abrasiveness.

Figure 13.1 Conversion of MAi to Ai the single illustrating testwork result



Gangue appears to be a mixture of carbonates and silicates but there is limited information on the variability. The following extract from Section 3.6 of the Valor scoping study, Salva Mining (2018) indicates that abrasive silica levels should be low.

"The Mn ore is porous and has often the texture of laterite. Cavities are filled with decomposed dolomitic limestone of yellow clay. The Mn ore contains hydrated iron oxides and all gradations exist from solid Mn ore with 30% MnO_2 to manganiferous decomposed limestone and a yellow brown clay with only 5-10% Mn. The yellow clay is known as panizo and can contain high silver values.

The following extract from Section 3.2 of the scoping study describes Berenguela mineralization as follows:

"The ore bodies are composed of black Mn minerals, including psilomelane, pyrolusite, todorokite, and chalcophanite, together with a variety of hydrated iron oxides. The ores show a variety of amorphous to banded and concretionary textures. The black ore is cut by an irregular network of vuggy veins containing malachite, azurite, covellite, chalcopyrite, chrysocolla, pyrite and native silver, associated with the gangue minerals calcite, dolomite, black silica and jasper."

Contrary to the above Pollandt and Pease (1960), reports higher levels (22%) of silicates.

Table 13.4 Typical sample assay from early testwork (pre 1960)

	Percent
SiO_2	22.0
MnO_2	32.4 (including MnO expressed as MnO_2)
$CaCO_3$	22.0
Al_2O_3	2.6
Fe_2O_3	14.0
Cu	1.5
Others	5.5 (including Ag, 5-20 oz per ton (=0.015-0.06 percent)
Total	**100.0**

Samples selected for the 1995 KCA testwork were described as containing "clay" but generally ranged from 1 to 4% moisture with one sample at 6.8% moisture, ranging from 10 to 36% silica. The bulk composite samples were all about 20% silica, 20% Mn, 360 g/t Ag, and 1.7% Cu.

Comminution circuit design should take into consideration potential abrasiveness and the potential to overgrind the Mn minerals in plant practice due to their higher SG. Consideration may need to be given to adjusting grind targets coarser than used in the laboratory to adjust for the impact of cyclone classification in the plant.

13.4.1 Ore domain classifications

Earlier ore domain classification by ASARCO / Minero Peru contained four categories and these were subsequently simplified by Valor into three Mn grade categories. Given the complexity of the resource the latter classification appears oversimplified. Proving the ore classifications is considered key to establishing recovery performance throughout the resource. The degree of refractoriness or encapsulation in the Mn matrix may be correlated with Mn grade, MnO_2 content, Fe oxides content, Ag cyanide solubility, clay content, or other.

Table 13.5 ASARCO and Valor mineral domain classifications

	ASARCO / Minero Peru [1]	Vol %	Valor (interim) [2]	Vol %
I	Yellow, orange, and red altered limestone comprising 50% Mn oxides by volume and hydrated Fe oxides.	65	High grade, Mn >10%	45
II	Brown manganiferous hard ore with high dolomite content but relatively low grade.	5	Medium grade, Mn 5-10%	34
III	Yellow friable material with less than 50% Mn by volume but high Ag content.	5	Low grade, Mn <5%	21
IV	Yellow friable material with minor manganese and less than 1% combined metals; represents low grade.	10		

Notes:
[1] Basis for volume estimate unknown.
[2] Volume estimate from block model.

The assays of the samples in the tables below shows significant variability from whole rock assay to Ag, Cu, Mn, and Zn.

Brown ore was shown to be most refractory to leaching Cu and Zn in simple acidic solution; Yellow ore was least refractory. The distribution of the mineral components is not known.

Table 13.6 Head assay of main composites

Composite ID	Fire assays (g/t)		Cu (%)	Pb (%)	Zn (%)	Mn (%)	S (%)
	Ag	Au					
Yellow Ore	197	0.01	1.39	0.023	0.18	4.22	0.08
Brown Ore	3,676	0.02	2.06	0.042	1.28	36.3	0.16
Massive Ore	274	0.01	0.76	0.039	1.08	21.1	0.15
Underground Ore	311	0.01	2.42	0.212	0.59	12.6	0.09

Source: PRA 2006.

Table 13.7 Whole rock assay summary

Sample ID	Compound as Indicated (%)								
	Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	MnO	Na_2O	Sio_2	LOI
Yellow Ore	6.69	16.5	3.87	2.40	2.71	5.55	0.37	37.9	21.7
Brown Ore	0.73	1.73	14.37	0.40	0.26	47.29	0.29	7.83	16.0
Massive Ore	1.31	12.5	10.24	0.72	3.84	29.37	0.35	12.9	24.3
Underground Ore	6.60	10.8	7.91	1.72	0.41	16.64	0.37	34.0	16.8

Source: PRA 2006.

13.5 Magnetic separation

13.5.1 Wet high intensity magnetic separation

Wet high intensity magnetic separation (WHIMS) conducted by PRA (2006) at P_{80} 142 μm and 20,000 gauss intensity showed poor recovery of Ag 47% and Mn 48% to magnetics for yellow ore (Table 13.8).

WHIMS tests conducted on brown ore resulted in slightly poorer recovery of Ag 44% and Mn 44% to magnetics, at the coarser grind size of P_{80} 216 μm (Table 13.9).

WHIMS was considered unsuccessful on yellow and brown ore categories.

Table 13.8 WHIMS on yellow ore

Product type	Size (µm fraction)	Assay		Distribution (%)		
		Ag (g/t)	Mn (%)	Ag	Mn	Weight
Mag	+44	625	17.1	37.1	38.2	10.3
Mag	-44	631	16.4	9.6	9.6	2.6
Mag	**Overall**	**626**	**16.7**	**46.7**	**47.8**	**13.0**
Non-mag	+44	82	2.9	12.5	17.1	27.2
Non-mag	-44	118	2.7	40.6	35.1	59.9
Non-mag	**Overall**	**107**	**2.8**	**53.2**	**52.2**	**87.0**
Head	**142**	**174**	**4.57**	**100.0**	**100.0**	**100.0**

Source: PRA 2006.

Table 13.9 WHIMS on brown ore

Product type	Size (µm fraction)	Assay		Distribution (%)		
		Ag (g/t)	Mn (%)	Ag	Mn	Weight
Mag	+44	4,735	45.7	33.8	34.5	30.5
Mag	-44	4,555	39.0	10.4	9.4	9.8
Mag	**Overall**	**4,691**	**44.1**	**44.2**	**43.9**	**40.3**
Non-mag	+44	4,568	45.6	32.1	33.9	30.0
Non-mag	-44	3,394	30.1	23.6	22.1	29.7
Non-mag	**Overall**	**3,987**	**37.9**	**55.8**	**56.1**	**59.7**
Head	**216**	**4,268**	**40.4**	**100.0**	**100.0**	**100.0**

Source: PRA 2006.

13.5.2 High intensity magnetic separation

Prospero conducted a metallurgical testwork program (Prosper 2018) which included dry high intensity magnetic separation (HIMS) tested at their in-house laboratory in Brazil. A 944 kg sample was generated by blending drill core extracted during the 2015 and 2107 drilling campaigns. Five size fractions from a 224 kg sub-sample were dried and subject to HIMS at approximately 10,000 gauss intensity (Table 13.9).

A mass recovery of 80% to magnetics resulted in high metal recoveries Cu 89%, Mn 94%, Zn, 94%, Ag 86%. Rejection of carbonates was not measured but would be expected to be high considering non-magnetic properties.

HIMS performance across the range of variability in Mn mineralogy will need to be validated and this is a critical precursor process to feed to the hydrometallurgical process.

Table 13.10 HIMS by size fraction

Size	Process / fraction	Distr %	Grade Cu %	Cu % distrib head	Grade Mn &	Mn % distrib head	Grade Zn %	Zn % distrib head	Grade Ag ppm	Ag % disrib head
<4 mm >2.0 mm	Magnetic	9.5	1.6	10.7	19.10	11.3	0.60	11.1	170	10.7
<2.0 mm >1.0 mm	Magnetic	13.8	1.54	15.5	18.30	16.5	0.60	16.3	206	15.8
<1 mm > 100#	Magnetic	15.6	1.64	18.1	18.90	18.8	0.60	18.5	190	16.0
<100# > 325#	Magnetic	9.4	1.17	10.3	12.10	10.8	0.32	11.1	122	10.1
< 325#	Magnetic	31.4	1.39	34.3	13.79	36.1	0.36	37.2	111	33.8
Total	**Total**	**80**	**1.46**	**89**	**14.33**	**93**	**0.30**	**94**	**151**	**86**

Source: Prospero 2018.

13.6 Segregation roasting

Segregation roast involves use of coking coal as a reductant with acid and salt to produce metallic Cu and Ag separated from the calcine. The flowsheet considered at the time included subsequent recovery of Cu and Ag by flotation.

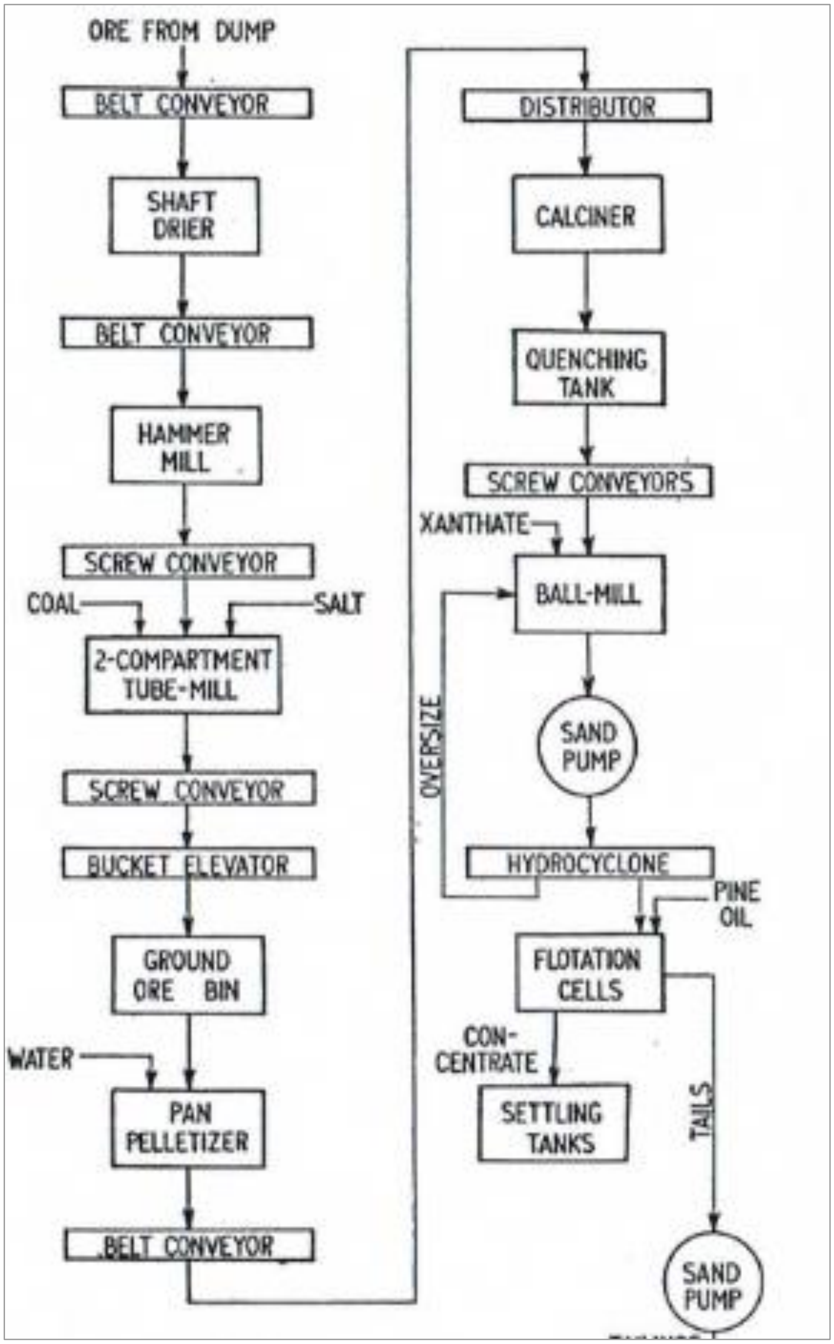
Consideration of the potential to recover Mn at pilot plant level is described by Pollandt and Pease (1960).

Key points from Pollandt and Pease include:

- After many years of laboratory / technical work a 1 ton/hr pilot plant was constructed to extract Cu and Ag.
- Feed grade 1 - 2% Cu, 5 - 20 oz Ag/tonne.
- Berenguela argentiferous, cupriferous manganese deposit is of a very rare type. Most of the Cu is not present as recognisable minerals but associated with Mn oxide minerals.
- The segregation process involves heating oxide Cu ore with coal and salt at 680 - 750°C to produce particles of metallic Cu.
- Both Cu and Ag were effectively extracted in the pilot plant.
- Recovery of Cu of 80 - 85% was achieved continuously over a number of days.
- Recovery of Ag was around 80%.

A block flow diagram of the Segregation Roast flowsheet is presented in Figure 13.2.

Figure 13.2 Schematic flowsheet for segregation roasting



Source: Pollandt and Pease 1960.

Further work was completed post the 1960 paper, but the results and interpretation are generally unchanged for Flowsheet 1 – technically feasible but with modest return on investment.

Due to the requirement for a fine grind for pelletization (P_{80} of < 150 micron) followed by calcination, this process is not likely to be suited to the effective recovery of manganese to a concentrate by magnetic separation unless concentration occurs after the milling stage. Magnetic separation prior to roasting may result in flotation tailings to be a saleable manganese product but further treatment would be required to produce high value manganese products.

Work at INGEMMET in 1985 (INGEMMET & JICA 1985) was done on the impact of magnetic separation prior to segregation roast and post segregation roast. The grades of magnetic concentrates post segregation roast showed a very poor upgrade (constant 22% Mn in concentrate with all mass recoveries). Pre roasting, a grade of 56% Mn was achieved, but at low recovery (approx. 35% Mn). Attempts to achieve higher recoveries at higher magnetic intensities significantly reduced concentrate grade.

Hence, based on the historical testwork, the segregation roast approach will not recover Mn to a saleable product and is not considered a viable option.

13.7 Controlled potential sulphidation flotation

Ore - Roast - Calcine CPS flotation - ship concentrate.

The results of roast and CPS flotation flowsheet are summarized in Table 13.11 of the Valor scoping study, Salva Mining (2018) with very little context.

Flotation of roaster product is reported in the following reports:

- 1985_00 INGEMMET-JICA segregation roast lab test (INGEMMET tests).
- 1994 04 19 Minero Peru summary of previous testwork & TORCO (Milan tests).
- 2014 12 15 XPS-Segregation Roasting of Berenguela Ore Final Report prepared for Silver Standard Resources (XPS tests).

All of these CPS tests were done on reduction roast (coke and salt) product. As such, a manganese product cannot be produced. Results are summarized in Table 13.11.

Table 13.11 CPS flotation (extract Scoping Study 2018)

Milan Pilot Plant results - Flotation result on calcined ore at Milan Pilot Plant

		Weight (%)	Copper (%)	Silver (g/t)	Copper recovery (%)	Silver recovery (%)
Test V-4	Head	100	2.06	245	100	100
	Concentrate	5.6	31.8	3,862	86.2	88.1
	Tailings	94.4	0.29	28.9	13.8	11.9
Test V-5	Head	100	2.72	245	100	100
	Concentrate	7.8	32.9	2,992	94.2	93.5
	Tailings	92.2	0.17	17.34	5.8	6.5

Testwork at INGEMMET (Peru) – Flotation result on calcined ore at INGEMMET (Peru)

	Weight (%)	Copper (%)	Silver (g/t)	Copper recovery (%)	Silver recovery (%)
Head	100	N/A	N/A	100	100
Concentrate	5.6	30	7,000	88.2	67.4

Testwork by XPS Consulting – Flotation result on calcined ore by XPS Consulting

	Weight (%)	Copper (%)	Silver (g/t)	Copper recovery (%)	Silver recovery (%)
Head	100			100	100
Concentrate	5.6	38.6	5,930	75	75

13.8 Sulphuric acid reductive leach

Testwork programs over the years have focussed on a reductive acid leach to dissolve Cu and Mn prior to separation of solids and liquids. The solids were then neutralized, and the Ag leached with cyanide. When Mn was effectively reduced (Mn^{4+} to Mn^{2+}), high Ag cyanide extractions of 90 - 98% were achievable, depending on particle size and conditions.

Table 13.12 presents a comparison of Cu and Mn extractions for reductive and non-reductive acid leach. In the absence of a reductant Mn is not leached.

Silver, like gold, does not leach in sulphuric acid. A NaCl / HCl (salt / hydrochloric acid) or NaCN (cyanide) leach is required.

Mineralogy and testwork shows the Mn matrix encapsulates Ag, therefore without Mn dissolution Ag cannot be liberated.

Table 13.12 Comparison of reductive and non-reductive acid leaches

Laboratory	Feed sample	Reductant	Cu-extraction (%)	Mn extraction (%)	Comment
KCA	Whole ore	Nil	22 – 93	0 – 11	Brown to yellow ore
KCA		SO_2 or SMBS	69 - 97	62 - 99	Brown to yellow
Prospero	HIMS Concentrate	H_2O_2	89 - 98	90 - 94	Blend
FreoMet	Prospero HIMS Concentrate	Nil	80	7	Blend
FreoMet		SMBS	82 – 96	94 - 98	-

13.8.1 KCA

Early KCA (Valor 2018) testwork conducted in 1997 demonstrated greater than 90% Mn was leached into solution in a reductive SO_2 acid leach at pH 2. A subsequent pH of 1 resulted in Cu extraction of greater than 88% and up to 96%.

Table 13.13 KCA reductive acid leach testwork results

KCA test number	23766	23768	23770	23772	23774
Conditions					
Feed ID	23108	23108	23108	23108	23108
Ore batch size (g)	300	300	300	300	300
Starting H_2O mass (g)	600	600	600	600	600
SO_2 leach pH target	**5**	**4.5**	**2**	**2**	**2**
Leach time (min)	35	50	100	95	90
SO_2 flow rate (mL/min)	440	440	440	440	440
H_2SO_4 makeup pH target	**1**	**1**	**1**	**1**	**1**
Reagent dose					
Total H_2SO_4 added (kg/t ore)	**324**	**338**	**293.5**	**345.6**	**345.6**
Total SO_2 added (kg/t ore*)	---	---	---	---	---
SO_2 consumed (kg/t ore*)	**---**	**---**	**---**	**---**	**248**

KCA test number	23766	23768	23770	23772	23774
Extraction					
Mn (%)	**63.4**	**90.4**	**99.2**	**92.5**	**96.1**
Cu (%)	**77.3**	**83.5**	**96.4**	**87.5**	**91.8**
Ag (%)	0.4	0.5	0.3	0.6	0.5
Fe (%)	7.0	9.2	26.3	25.8	23.9
Ca (%)	---	---	---	---	---
Mg (%)	86.5	88.4	80.2	88.1	91.4
Zn (%)	---	---	---	---	---
Leach filtrate concentrates					
Mn (g/L)	36.6	49.8	53.2	54.5	55.4
Cu (g/L)	3.8	3.9	4.4	4.4	4.5
Ag (mg/L)	0.4	0.5	0.3	0.6	0.5
Fe (g/L)	1.2	1.5	4.1	4.4	4.0
Ca (g/L)	---	---	---	---	---
Mg (g/L)	4.9	4.8	4.3	5.1	5.2
Zn (g/L)	---	---	---	---	---

Note: *If no value is reported, the exact quantity of SO_2 (added or consumed) was not measured or calculated on a weight basis. The quantity could be roughly estimated by the SO_2 flow rate and time of addition (leach time).
Source: KCA 1997.

KCA was subsequently commissioned by Silver Standard to replicate earlier KCA testwork and generate sample for solid-liquid separation. This 2010 reductive acid leach testwork by KCA (2010) demonstrated high Mn and Cu dissolution with correspondingly high Ag dissolution in a subsequent cyanide leach step. KCA test conditions and observations included:

- Whole of ore pre-leach at pH 4 to remove 60 - 70% of Mg prior to reductive leach.
- P_{80} 140 micron grind and 25 wt% solids.
- Reductive sulphuric acid leach using SO_2 on pre-leach residue.
- Leach residence time 115 min at ambient temperature.
- Subsequent cyanide leach after neutralization of tailings at 5 g/L for 50 hr.
- SO_2 consumption averaged 346 kg/t (250 kg/t ore).
- H_2SO_4 consumption estimated at 330 kg/t (total).
- KCA observed high viscosity, gel-like samples at density greater than 25 wt% solids.

Table 13.14 KCA ore head grades 2010

	Mn (%)	Cu (%)	Ag (g/t)	Fe (%)	Ca (%)	Mg (%)	Zn (%)
24765A	19.0	1.34	342	5.63	8.53	1.74	0.78
23108A	19.0	1.27	377	5.67	8.15	1.80	0.74

13.8.2 Prospero

In 2018, Prospero took the HIMS product (Section 13.5.2) for subsequent reductive acid leaching. The -1 mm + 150 µm fraction was chosen for testing.

This reductive acid leach testwork demonstrated high Mn and Cu dissolution with corresponding high Ag dissolution in a subsequent cyanide leach step. Prospero test conditions and observations included:

- HIMS concentrate -1 mm +150 µm fraction; 20 g per test.
- P95 45 µm grind and 9 wt% solids.
- Reductive sulphuric acid leach using H_2O_2 HIMS magnetics.
- Heating at 90°C for 2 hrs leach time.
- On average, over 90% Mn, 85% Cu, and 72% Zn extraction with minimal extraction of Ag.
- Test 9 equates to an acid consumption of 0.55 tons H_2SO_4 per ton ore. Significantly lower than KCA whole ore leach.

Table 13.15 Prospero reductive acid leach results

Sample magnetic < 1.0 mm > 150 µm			Mn %	18.9	Cu %	1.64	Zn %	0.6	Ag ppm	190
H2O2 200 vol	Time	Temp.		Recover %		Recover %		Recover %		Recover %
20 DILU.	02:00	90°C	17.10	90.5	1.58	96.3	0.50	83.3	0.10	0.1
20 DILU.	02:00	90°C	17.30	91.5	1.60	97.6	0.50	83.3	0.10	0.1
20 DILU.	02:00	90°C	17.40	92.1	1.58	96.3	0.50	83.3	0.10	0.1
20 DILU.	02:00	90°C	17.00	89.9	1.61	98.2	0.50	83.3	0.10	0.1
20 DILU.	02:50	90°C	14.70	77.8	0.40	24.4	0.30	50.0	< 0.01	-
20 DILU.	02:00	90°C	17.60	93.1	1.46	89.0	0.40	66.7	< 0.01	-
20 DILU.	02:00	90°C	17.80	94.2	1.45	88.4	0.40	66.7	< 0.01	-
20 DILU.	02:00	90°C	17.45	92.3	1.43	87.2	0.40	66.7	< 0.01	-
20 DILU.	02:00	90°C	17.60	93.1	1.42	86.6	0.40	66.7	< 0.01	-
	Average recover			**90.5%**		**84.9%**		**72.2%**		**0.1%**

Source: Prospero 2018.

13.8.3 FreoMet

Subsequent testing commissioned by Valor at FreoMet (Wellham 2019) laboratories used the same bulk HIMS magnetic concentrate to replicate the Prospero conditions. 100 kg of HIMS magnetic concentrate was shipped to FreoMet in Australia from Prospero in Brazil. It is unclear if this was the same size fraction as Propsero leach.

Hydrogen peroxide as reductant did not liberate Mn, and subsequently Ag, as effectively as SO_2 or sodium metabisulfite (SMBS). FreoMet conditions included:

- HIMS magnetic concentrate leach at grind size assumed to be the same as Prospero P195 45 µm.
- Reductive sulphuric acid leach using H_2O_2 or SMBS.
- Leach residence time 2 to 6 hrs at 90°C.
- Subsequent cyanide leach after neutralization of tailings at 10 g/L for 24 hr.
- Sample size was limited to 20 g compared with KCA at 250 to 750 g.

FreoMet reductant leach using H_2O_2 did not perform as well as Prospero at the same conditions.

13.8.4 Summary

A summary of the results from KCA, Prospero and FreoMet are presented in Table 13.16.

Key conclusions include:

- SO_2 or SMBS was most effective reductant and superior to H_2O_2.
- The SO_2 or SMBS reductant facilitates attack of the Mn matrix and effectively liberates Mn.
- Attack of Mn matrix effectively liberates Ag for dissolution in subsequent cyanide leach.
- H_2O_2 is a large consumer of sulphuric acid and is not the favoured reductant.
- The reductive acid leach process is considered a viable option to recover Cu and Mn and liberate Ag for subsequent cyanidation.
- It is recommended to further prove the HIMS concentration step to significantly reduce reagent consumption and solid-liquid separation difficulties.

Table 13.16 Reductive leaches – best performing from KCA and FreoMet campaigns

Condition	Acid leach extraction (%)					Cyanide extraction (%)
	Mn	Cu	Fe	Zn	Ag	Ag
KCA 2010 (50030 **250g sample**, 50054 **750 g sample**): P_{80} 140 µm Pre-leach + SO_2 leach pH 2 + H_2SO_4 to pH 1 (115 min ambient); 25 wt% solids (50058, 51822) CN leach 5 g/L 50 h	98	88	37	N/A	0.7	92-98
Prospero 2018 (Test 9; 20 g HIMS conc sample), P_{80} 45 µm, H_20_2 + H_2SO_4 (120 min at 90°C), 9 wt% solids	93	87	N/A	67	0.1	96
FreoMet (B2 490 g sample) **H_2O_2** leach + H_2SO_4 (2 hr 90°C); 4 wt% solids CN leach 10 g/L 24 h	56	92	N/A	N/A	N/A	45
FreoMet (Run 8; **20 g sample**) H_2O_2 leach + H_2SO_4 (2 hr 90°C); 5 wt% solids CN leach 10 g/L 24 h	87	85	N/A	N/A	N/A	10
FreoMet (Run 16; **20 g sample**); SMBS + H_2SO_4 (2 hr ambient); 10 wt% solids CN leach 10 g/L 24 h	79	72	N/A	N/A	N/A	67

KCA noted that at ambient temperature the reductive acid leach generated dithionate ions ($S_2O_6^{2-}$). Dithionate ions are detrimental to electrolytic manganese dioxide (EMD) production. However, at increased leach temperature of 80°C or greater dithionate was not formed. The exothermic reaction heats the ambient test to around 60°C.

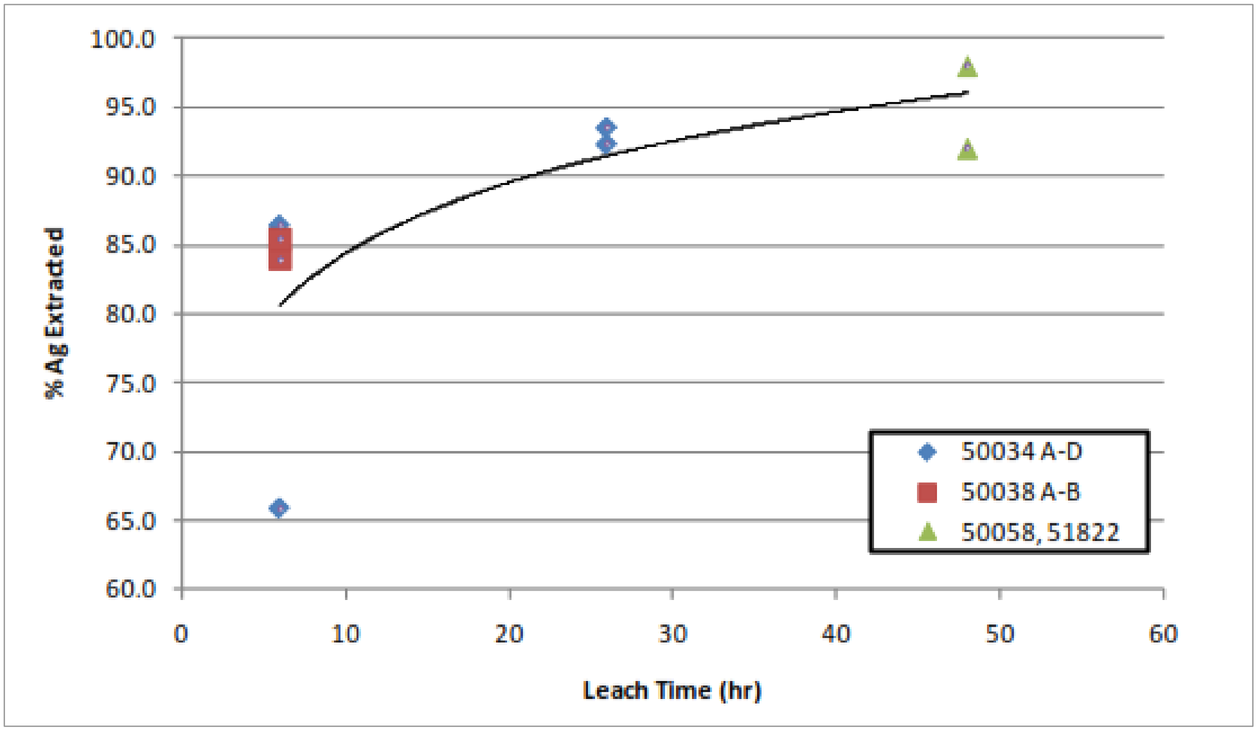
13.9 Silver extraction

13.9.1 Cyanide leach (post reductive acid leach)

13.9.1.1 KCA

Following the reductive acid leach, KCA filtered and washed the sample prior to pH adjustment and cyanidation. The general trend of cyanide leach extraction of Ag versus time is presented in Figure 13.3, showing extraction progressing to 48 hrs. The slurry was particularly viscous and had to be diluted to 20 wt% solids. This indicates settling in a CCD wash circuit will be problematic.

Figure 13.3 Cyanide leach Ag extraction vs time - post reductive acid leach



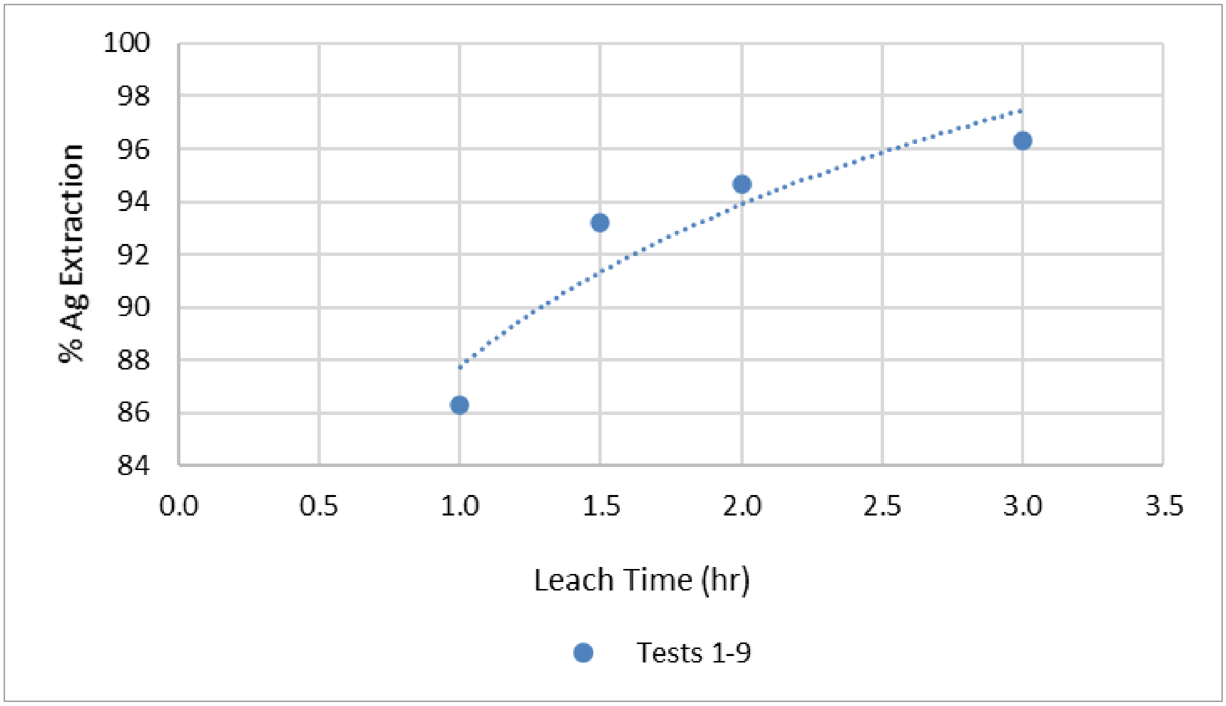
Source: KCA 2010.

Lime consumption, to neutralize the acidic residue and raise the pH to 10.5, ranged from 11 to 13 kg/t. Cyanide consumption ranged from 3.6 to 4.2 kg/t SO_2-leach residue.

13.9.1.2 Prospero

Following the reductive acid leach, Prospero filtered and washed the sample prior to pH adjustment and cyanidation. Leach extraction of the concentrate leach residue was much faster than whole of ore residue. The acid leach residue (cyanide leach feed) contained 164 g/t Ag.

Figure 13.4 Cyanide leach Ag extraction vs time-post HIMS Concentrate reductive acid leach-Prospero



Source: Prospero.

13.9.2 Calcine leach (post reductive roast)

Earlier acid leach investigations included leach of the reductive roast calcine. Favourable conditions for extraction of Ag and Cu (Table 13.17) included:

- 400°C roast in carbon monoxide environment followed by NaCl, HCl acid leach; 95 - 97% Cu extraction and 83 - 84% Ag extraction (acid leach only) on two samples.
- 400°C roast in carbon monoxide environment followed by H_2SO_4 leach; 94% Cu extraction and 82% Ag extraction (acid leach only).
- 400°C roast in carbon monoxide environment followed by H_2SO_4 and Fe^{3+} primary leach (94% Cu, 85% Ag) and NaCl, HCl secondary leach; 95% total Cu extraction and 91% total Ag extraction (acid leach only).

Pertinent comments include:

- High temperature roast (700°C) was not favoured due to reduced Cu extraction.
- High sulphuric acid consumption at 1.16 t 96% H_2SO_4/t roasted ore.
- High hydrochloric acid consumption 2.42 t 33% HCl/t roasted ore.

This flowsheet has the benefit of extracting silver into acid leach solution. However, this comes at the cost of high reagent consumptions with a roast process up stream. This option is not considered economic.

Table 13.17 Reductive roast leach extractions

Condition	Acid leach extraction (%)				CN leach extraction (%)	
	Mn	Cu	Fe	Ag	Ag	Cu
Non -roasted	2	56	1.6	-	-	-
Roasted at 600°C in N_2 & CO for 30-60 min; P_{100} 75 µm; **Leach in H_2SO_4** Sample 22301 only	90-93	100	73-79	-	54-85	0.04-0.06
Roasted at 700°C in N_2 & CO for 60 min; P_{100} 75 µm; **Leach in H_2SO_4** Samples 22301-22308	86-100	13-100	50-100	-	-	-
Roasted at 400°C in CO for 120 min; P_{100} 75 µm; **Leach in H_2SO_4** Sample 23117	100	94	78	82	-	-
Roasted at 600°C in CO for 120 min; P_{100} 75 µm; **Leach in NaCl, HCl** Sample 23117	100	95	78	83	-	-
Roasted at 400°C in CO for 120 min; P_{100} 75 µm; **Leach in NaCl, HCl** Samples 23115	89	97	91	84	-	-
Roasted at 400°C in CO for 120 min; P_{100} 75 µm **1st leach in H_2SO_4 & Fe^{3+}** **2nd leach NaCl/HCl & Fe^{3+}** Samples 23123	94/100	94/95	-	85/91	-	-

13.9.3 Reductive chloride leach (whole ore)

PRA (2006) demonstrated a whole of ore chloride leach (200 g/L NaCl) achieved high silver extractions in a reducing environment using SO_2. 92% Ag extraction was achieved without a subsequent cyanidation step. Acid consumption was prohibitively high at 400 kg/t.

This option could be considered post magnetic separation if acid / salt consumption is significantly reduced by the removal of carbonates. This flowsheet has the benefit of avoiding neutralization and cyanidation of the acid leach residue stream. High reagent consumptions and potential LSS issues reduce the viability of this option.

Table 13.18 Silver chloride leach

Test No. – Comp. ID	Chloride leach conditions									Final res. (g/t Ag)	Acid (% Ag extr.)
	P_{80} (µm)	Temp (°C)	PD (% solids)	Acid (kg/t)	SO_2 (kg/t)	pH	ORP (mV)	Mn (% extr.)	Cu (% extr.)		
HCI1-Y	50	90	24	663	None	1.9	767	18.9	82.9	55	82.4
SCI2-Y	50	60	33	400	Gas	2.5	272	95.8	86.6	20	91.7

Source: PRA 2006.

13.10 Copper electrowinning

PRA conducted direct Cu EW on reductive leach PLS using EMEW cells. Cu tenors were reduced to low levels within 1.5 hours.

Lower Mn and Fe levels produced >99% Cu purity. Higher Mn and Fe levels caused cathode quality to reduce to 90% Cu with accompanying Mn and Fe plating out. Results show that Cu depletion progresses to low tenors but with decreasing current efficiencies ranging from 77 to 25% (Table 13.19).

Table 13.19 Direct Cu EW at 400 A/m^2 current density

Composite sample ID	Test No.	Average levels		Plated Cu (g)	Overall % CCE	Cu tenors (g/L)		
		Mn (g/L)	Fe (g/L)			0 h	1 h	1.5 h
SL6-Y PLS+wash	E1	3.55	3.97	4.40	77	2.95	0.31	N/A
SL7-B PLS+wash	E2	71.0	0.52	8.66	68	3.55	1.85	0.74
SL8-M PLS+wash	E3	10.0	2.78	2.43	25	1.31	0.08	0.01

Source: PRA 2006.

Figure 13.5 Photo of Cu plated to depletion

Source: PRA 2006.

During KCA's 2010 testwork campaign, extensive Cu electrowinning testwork was conducted directly on reductive acid leach pregnant leach solution using a conventional, parallel plate electrolytic cell. The scope included:

- Batch tests at varying current densities and temperatures to determine selectivity for Cu reduction, acid generation efficiencies and current efficiency relationship.
- Continuous tests investigated plate and powder forms of Cu at varying current density, lean Cu concentration on current efficiency and Cu quality.

Continuous test results are summarized in Table 13.20. Cu was electrowon as Cu powder to >95% purity at a current density of 140 A/m^2. However, due to the high contaminant load of Mn and Fe compared with relatively low Cu tenors only 30 - 45% current efficiencies were attained. Very low current density of 35 A/m^2 satisfied generation of plated Cu but with even lower current efficiency 25%.

An additional precipitation stage may be required to reduce the lean electrolyte concentration and recover the remainder of the Cu.

Table 13.20 Direct copper electrowinning

Sample ID	**51886**	**51889**	**51891**	**51901**
Date	28 Sep 2010	30 Sep 2010	1 Oct 2010	4 Oct 2010
Test description	Cu-EW	Cu-EW	Cu-EW	Cu-EW
Single anode (A) or bicell (B) configuration	B	B	B	B
Batch or continuous	Continuous	Continuous	Continuous	Continuous
Approximate batch size (mL electrolyte)	1,000	1,000	1,000	900
Cell conditions				
Anode material	Pb	Pb	Pb	Pb
Cathode material	SS316	SS316	SS316	SS316
Cathode current density (mA/cm²)	**6.8**	**3.9**	**13.0**	**13.0**
Voltage	2.0	1.7	2.6	2.6
Temperature (°C)	40	40	40	40
Lean electrolyte Cu concentration (g/L) [1]	**0.81**	**0.96**	**0.88**	**1.39**
Total EW time (hr)	7.5	6.0	3.0	1.7
Mixing method (pump or stir bar) [4]	Stir bar	Stir bar	Stir bar	Stir bar
Cell electrolyte	Synthetic [3]	51886	51889	51891
Feed electrolyte [2]	50092	50092	50092	50092
General results				
Theoretical Cu plated (g)	6.99	2.62	5.54	2.95
Actual Cu plated (g)	2.10	0.57	2.02	1.70
Overall cathode current efficiency (%)	**30.1**	**21.8**	**36.5**	**57.6**
Extraction ratio (%)	---	--	--	--
Acid regeneration efficiency (%)	100	100	100	100
Specific energy consumption (kWh/kg Cu)	5.6	7.0	7.3	3.8
Form of Cu (powder, plate, or mixed)	Powder	Plate	Powder	Powder
Approximate percentage of powder	100	0	100	100
Approximate percentage of plate	0	100	0	0
Initial electrolyte composition				
Mn (g/L)	47.1	51.8	56.5	---
Cu (g/L)	**0.68**	**0.79**	**1.07**	**1.45**
Fe (g/L)	5.2	5.7	6.1	---
Mg (g/L)	0.9	1.0	---	---
Zn (g/L)	2.3	2.4	2.4	---
H_2SO_4 (g/L)	8.5	10.8	10.3	9.6
pH	1.54	1.59	1.55	1.81

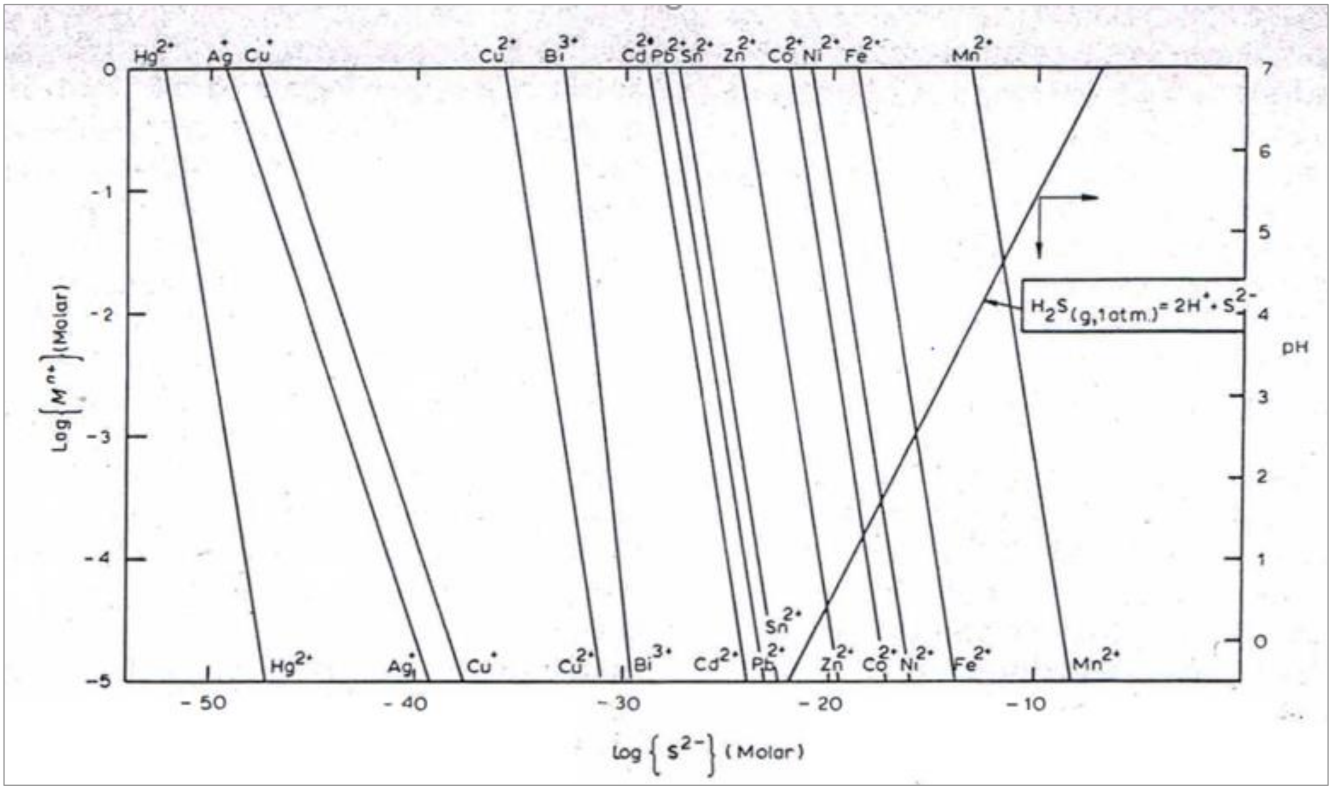
Sample ID	51886	51889	51891	51901
Final electrolyte composition				
Mn (g/L)	48.7	53.4	56.0	---
Cu (g/L)	**0.81**	**0.96**	**1.14**	**1.39**
Fe (g/L)	5.2	5.9	6.0	---
Mg (g/L)	0.9	1.2	---	---
Zn (g/L)	2.3	2.4	2.3	---
H_2SO_4 (g/L)	9.5	11.0	10.3	9.7
pH	1.5	1.5	1.5	1.7
Cathode material assay				
Mn (%)	0.036	0.013	0.012	0.008
Cu (%)	**102.7**	**103.7**	**101.9**	**101.4**
Ag (%)	---	---	---	---
Fe (%)	0.027	0.019	0.021	0.021
Ca (%)	---	---	---	---
Mg (%)	---	0.003	---	---
Zn (%)	0.003	0.003	0.002	0.008
Pb (%)	0.132	0.013	0.654	0.268
S (%)	0.122	0.015	0.085	0.021
C (%)	---	---	---	---

Notes:
[1] For continuous experiment only, represents the average steady state concentration maintained in the cell during the experiment.
[2] In the continuous experiment, cell electrolyte ID is the starting (steady-state) composition to be maintained and the feed electrolyte is rich in Cu and is what is fed to the cell during the experiment.
[3] Composition very similar to 50092 feed except for Cu concentration which was 0.68 g/L (50092 contained about 4.0 g/L).
[4] For pump mixing, about 350 mL/min solution was recirculated. This resulted in minor to moderate visual mixing. For stir bar mixing, visually the mixing was vigorous. A 2” stir bar was used at 300 RPM.
Source: KCA 2010.

13.11 Solution purification

The sulphide precipitation diagram (Monhemius et al. 1977) in Figure 13.6 shows that theoretically Zn, Co, and Fe should be precipitated prior to Mn recovery.

Figure 13.6 Sulphide precipitation diagram at 25°C



Source: Ausenco after Monhemius et al.

13.11.1 Iron removal

KCA used ammonium hydroxide (20 kg/t) and air to precipitate iron from barren solution ex-Cu EW (Table 13.21). Hydrated lime or limestone would be typically used and should be tested.

Over 98% of Fe was removed with 0.9% Mn and 33% Zn loss. Residual Cu also co-precipitated, as expected.

Table 13.21 Solution purification testwork summary

KCA test number	**51859**	**51861**
Conditions		
Feed ID (Cu-barren PLS)	Synthetic	51852
Solution quantity (mL)	664	1,770
pH target	3.5	3.5
Oxidant	Air	Air
(if air, flow rate) (mL/min)	1,000.0	1,750.0
Neutralizing reagent	NH_4OH	NH_4OH
Reaction temperature (°C)	85	85
Reaction time (min)	190	195
Reagent dose		
Neu. reagent added (g)	5.6	16.9
Neu. reagent added (kg/t ore)	**16.7**	**20.2**
Cake weight, dry (g)	12.19	32.53

KCA test number	51859	51861
Pregnant leach solution (feed)		
Volume (mL)	663	1,770
Mn (g/L)	39.6	37.1
Cu (g/L)	0.4	0.4
Fe (g/L)	7.5	5.0
Mg (g/L)	0.6	---
Zn (g/L)	1.2	1.4
Precipitated as solids		
Mn (%)	**0.9**	**3.6**
Cu (%)	83.0	79.4
Fe (%)	**98.6**	**100.0**
Mg (%)	---	---
Zn (%)	33.0	5.5
Pregnant leach solution (product)		
Volume (mL)	615	1,762
Mn (g/L)	39.2	35.8
Cu (g/L)	0.07	0.09
Fe (g/L)	0.1080	0.0017
Mg (g/L)	0.6	---
Zn (g/L)	0.79	1.36

Source: KCA 2010.

13.12 Zinc precipitation

KCA used ammonium sulphide ($(NH_4)_2S$) to precipitate Zn from the solution (15 kg/t) at approximately 2x stoichiometric excess. Initial tests were conducted on synthetic solution; the subsequent test on solution ex-Fe removal (Table 13.22). Other precipitants such as sodium hydrosulphide should be investigated.

Over 97% Zn was precipitated, along with residual Cu in solution at an ambient test temperature of 25°C. Earlier KCA work indicated an optimum temperature of 65°C. Up to 15% Mn was precipitated using synthetic solutions. Further work is recommended to examine Mn losses and optimize conditions.

Table 13.22 Zinc precipitation testwork summary

	51871A				51871B				51871C				51871D				51875	
Conditions																		
Feed IC (Cu and Fe-barren PLS)	Synthetic				Synthetic				Synthetic				Synthetic				51861	
Solution quantity (mL)	200				200				200				200				1,672	
Initial pH	4.4				4.4				4.4				4.4				4.2	
Precipitant used	$(NH_4)_2S$				$(NH_4)_2S$				$(NH_4)_2S$				$(NH_4)_2S$				$(NH_4)_2S$	
Quantity of precipitant (mL)	1.95				3.12				4.67				6.22				23.67	
Stoichiometric excess for zinc	**1.25**				**2**				**3**				**4**				**2**	
Reaction temperature (°C)	**25**				**25**				**25**				**25**				**25**	
Reaction time (hr)	**1**	**2**	**6**	**24**	**1**	**2**	**6**	**24**	**1**	**2**	**6**	**24**	**1**	**2**	**6**	**24**	**2**	**6**
Precipitated as solids																		
Mn (%)	**5.1**	**6.4**	**2.5**	**6.6**	**8.3**	**4.9**	**8.7**	**12.6**	**7.8**	**14.4**	**8.7**	**14.9**	**15.5**	**13.4**	**15.1**	**17.2**	**0.0**	**3.6**
Cu (%)	99.2	99.7	99.8	99.5	99.7	99.9	99.9	99.7	99.9	99.8	99.9	99.9	99.8	99.8	99.9	99.9	61.9	98.9
Zn (%)	**95.7**	**96.0**	**93.3**	**82.9**	**99.6**	**99.4**	**99.8**	**99.8**	**99.6**	**99.8**	**99.8**	**100.0**	**99.8**	**99.8**	**99.9**	**99.9**	**97.0**	**97.9**
Reagent dose																		
Neu. reagent added (g)	1.95				3.12				4.67				6.22				23.67	
Neu. reagent added (kg/t ore)	**9.5**				**15.2**				**22.8**				**30.4**				**15.2**	
Feed solution																		
Mn (g/L)	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	31.7	31.7
Cu (mg/L)	196	196	196	196	196	196	196	196	196	196	196	196	196	196	196	196	75	75
Zn (mg/L)	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,358	1,358
Product solution																		
Mn (g/L)	37.8	37.3	38.8	37.2	36.5	37.9	36.4	34.8	36.7	34.1	36.4	33.9	33.7	34.5	33.9	33.0	31.7	30.5
Cu (mg/L)	1.62	0.51	0.36	0.97	0.55	0.23	0.29	0.66	0.24	0.42	0.27	0.26	0.31	0.32	0.20	0.28	29.00	0.84
Zn (mg/L)	**62.8**	**58.3**	**98.2**	**252**	**6.4**	**8.3**	**2.9**	**3.5**	**6.3**	**3.7**	**2.3**	**0.6**	**3.3**	**2.6**	**1.6**	**1.3**	**40.9**	**29.0**

Source: KCA 2010.

13.13 Electrolytic manganese dioxide from purified solution

Electrowinning of manganese dioxide can be used to produce battery grade EMD or a lower grade specification Mn product as high grade metallurgical Mn ore. The metallurgical Mn ore market 10 years ago was considered a larger market than the high specification EMD, Electrolytic Manganese Metal (EMM) or $MnSO_4$ markets. Given the battery market today, this is shifting.

KCA investigated production of electrolytic manganese dioxide to metallurgical Mn ore specification (Table 13.23).

Observations included:

- Increased cell temperature (85°C) resulted in increased cell efficiency (80 - 90%) (Figure 13.7).
- A current density <30 mA/cm^2 was required for current efficiency > 55%.
- Graphite anode material provided more coherent manganese dioxide plates than lead.
- 5 g/L Fe is detrimental in the electrolyte and prevented MnO_2 formation. The threshold limit is not understood.
- Anode product ranged from 85 to 97% MnO_2. EMD specification is 92% with prescriptive impurity limits.

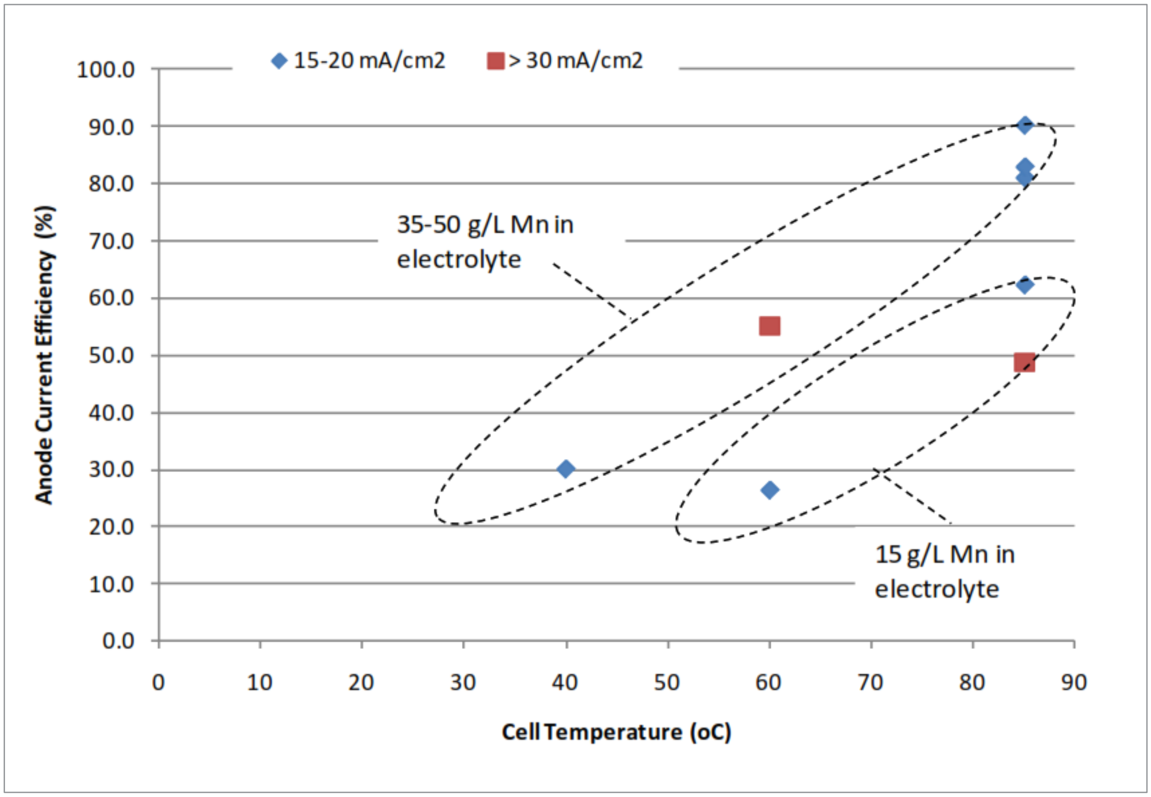
Table 13.23 Manganese dioxide electrowinning

Sample ID	**51818**	**51824**	**51820**	**51828**	**51854**	**51850**	**51870**	**51903**	**51905**	**51907**
Date	17 Aug 2010	19 Aug 2010	20 Aug 2010	23 Aug 2010	1 Sep 2010	2 Sep 2010	20 Sep 2010	5 Oct 2010	6 Oct 2010	7 Oct 2010
Test description	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW	MnO_2-EW
Single anode (A) or bicell (B) configuration	A	A	A	A	A	A	A	B	B	B
Batch or continuous	Batch	Batch	Batch	Batch	Batch	Batch	Batch	Batch	Batch	Batch
Approximate batch size (mL electrolyte)	600	900	900	900	1,000	900	1,000	1,000	1,000	1,000
Cell conditions										
Anode material	Pb	Pb	Pb	Pb	Graphite	Pb	Graphite	Graphite	Graphite	Graphite
Cathode material	SS316	SS316	SS316	SS316	SS316	Al	SS316	SS316	SS316	SS316
Anode current density (mA/cm^2)	**42.0**	**43.0**	**40.0**	**15.0**	**18.0**	**18.0**	**18.0**	**18.0**	**18.0**	**29.8**
Voltage	5.1	5.1	4.1/5.1	3.3	3.0-3.3	3.0-3.3	3.3	2.4	2.4	2.5
Temperature (°C)	24	60	80	0	85	85	40	85	60	85
Total EW time (hr)	4.0	6.0	6.3	7.5	7.5	6.0	6.0	6.0	6.0	2.0
Solution Desc.	Synthetic	Synthetic	Synthetic	Synthetic	Synthetic	Synthetic	Synthetic	Synthetic	Synthetic	Synthetic
General results										
Theoretical MnO_2 plated (g)	17.40	26.30	32.50	12.90	15.34	10.48	12.09	19.82	19.82	10.90
Actual MnO_2 plated (g)	0.14	14.47	0.00	11.05	12.44	8.70	3.63	12.35	5.21	5.35
Overall anode current efficiency (%)	**0.8**	**55.0**	**0.0**	**90.3**	**81.1**	**83.0**	**30.0**	**62.3**	**26.3**	**48.8**
Extraction ratio (%)	0.1	16.7	0.0	18.4	18.3	14.7	10.2	48.1	27.6	25.8
Acid regeneration efficiency (%)	---	---	---	89.5	80.5	86.2	75.7	78.7	82.6	65.4
Specific energy consumption (kWh/kg MnC)	416.3	5.9	---	2.3	2.4	2.5	7.2	2.4	5.6	3.2
Form of MnO_2	Soft flakes	Soft flakes	Soft flakes	Soft flakes	Hard plates	Soft flakes	Hard plates	Hard plates	Hard plates	Hard plates
Initial electrolyte composition										
Mn (g/L)	40.0	50.0	40.0	40.0	40.0	40.0	36.1	15.0	15.0	15.0
Cu (g/L)	0.2	---	0.2	---	---	0.5	---	---	---	---
Fe (g/L)	5	---	5	---	---	0	---	---	---	---
Mg (g/L)	0.5	---	0.5	---	---	0.5	---	0.5	0.5	0.5
Zn (g/L)	1	---	1	---	----	1	---	---	---	---
H_2SO_4 (g/L)	5.0	5.0	5.0	0.0	0.0	0.0	0.0	45.0	45.0	45.0
Ammonium sulphate (g/L)	---	---	125.0	40.0	40.0	20.0	40.0	---	---	---
pH	1.9	1.5	1.5	2.7	3.5	3.4	3.4	1.0	1.1	1.2

Sample ID	**51818**	**51824**	**51820**	**51828**	**51854**	**51850**	**51870**	**51903**	**51905**	**51907**
Final electrolyte composition										
Mn (g/L)	---	40.1	---	33.8	33.8	34.1	34.5	7.7	10.8	10.3
H_2SO_4 (g/L)	---	21.8	5.3	14.2	13.9	12.6	3.7	54.9	50.0	46.4
pH	1.8	0.9	1.3	1.0	1.4	1.4	2.0	1.0	0.9	1.0
Anode material assay										
Mn (%)	**---**	**60.7**	**---**	**61.4**	**57.8**	**60.2**	**54.4**	**54.3**	**50.1**	**53.6**
Equivalent MnO_2 (%)	**---**	**96.0**	**---**	**96.9**	**91.3**	**95.1**	**86.0**	**85.8**	**79.2**	**84.7**
Pb (%)	---	0.836	---	0.390	---	0.611	---	---	---	---
S (%)	---	---	---	0.660	1.069	0.660	2.210	0.985	2.109	2.632
C (%)	---	---	---	---	1.013	---	4.750	1.050	0.941	0.767

Source: KCA 2010.

Figure 13.7 Effect of temperature, current density, and Mn^{2+} concentration on MnO_2 current efficiency



Source: KCA 2010.

13.14 Liquid solid separation

Pre-leach, reductive leach, and cyanide leach residue from KCA (2010) campaign underwent flocculation selection, static settling tests, vacuum, and pressure filtration.

Results and conclusions are summarized below.

13.14.1 Settling

- Fresh ore slurry settled well to 50 wt% solids and P_{80} 104 μm.
- Reductive leach residue slurry settling rate decreased significantly at ambient or elevated temperature (90°C) compared with non-leached.
- Fine gypsum formation and colloidal silica may be interfering with settling rate and further investigation is warranted.
- Seed recycle to reduce the effect of gypsum was investigated without improvement.

Table 13.24 shows a comparison of underflow densities achieved at given settling times. Low densities were achieved for the leach residues.

Table 13.24 Comparison of static settling tests for various process stages

Sample ID	Stage	Feed slurry solids %	1 hr static settled density (% solids)	Overnight (16 - 24 hr) settled density
Ore-as-is	No processing	20	52.0	63.0
50044-1	Pre-leach	20	23.4	33.9
50078E	**SO_2 leach**	**14.5**	**15.8**	**19.8**
50067	**Cyanide leach**	**19**	**19.5**	**22.5**

13.14.2 Filtration

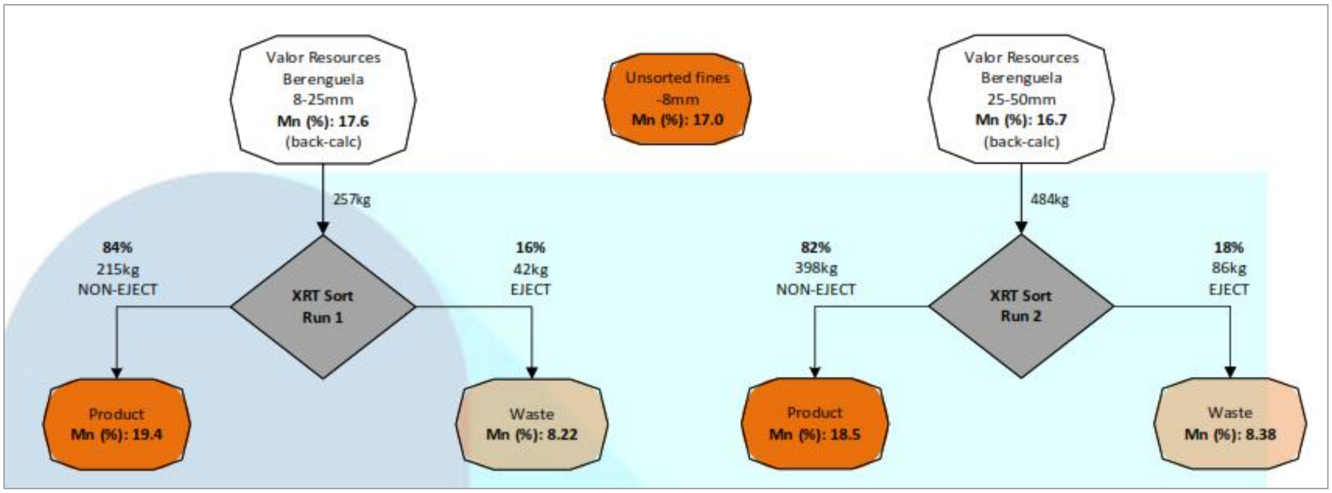
Vacuum and pressure filtration of leach residues resulted in high moisture levels with relatively poor filtration rates.

- Cyanide leach residue performed best in vacuum filtration (300 kg/m^2.h at 40 wt% solids) compared with acid residue leach (40 kg/m^2.h and 45 wt% solids).
- Cyanide leach residue performed best in pressure filtration (150 kg/m^2.h at 2.5 cm thick and 55 wt% solids) compared with acid residue leach (80 kg/m^2.h at 2 cm thick and 50 wt% solids). Very high moisture levels were retained for all tests.
- Filtration clarities were poor and ranged 500 – 1,000 mg/L and more. Cyanide leach was improved at 100 mg/L range.

13.15 Ore sorting

Preliminary ore sorting was trailed on a bulk sample obtained from near surface, with Mn grade ranging from 4 to 20%. Two size fractions were tested as depicted in Figure 13.8. Tomra's (2019) COM XRT sorter was used to distinguish between high and low density particles and effectively reject low density carbonates. From the results presented in Table 13.25 concentration of Ca and Mg is observed in the sorter waste stream, however loss of Mn was not favourable. TOMRA noted the quantity of liberated carbonate or Mn-deficient waste was limited in the provided sample.

Figure 13.8 Testwork flow and sorting results for Mn



Source: TOMRA 2019.

Table 13.25 Ore sorting assay results

Size	Run	Fraction	Mn (%)	Ca (%)	Mg (%)	Mass (kg)
N/A	N/A	Total feed	17.00	9.87	11.15	905
8 – 25 mm	Run 1	Sorter feed	17.6	10.6	3.8	257
		Product	19.4	10.3	3.41	215
		Waste	8.22	12	5.55	42
25 – 50 mm	Run 2	Sorter feed	16.7	10.9	3.9	484
		Product	18.5	10.6	3.54	398
		Waste	8.38	12.2	5.7	86
-8 mm	Unsorted	Fines	17	5.79	3.8	164

Source: TOMRA 2019.

13.16 Recommendations

13.16.1 Flowsheet considerations

Considering the four key flowsheets, Flowsheets 3 and 4, are the most favourable technically, environmentally (no roast) and they recover Ag, Cu, and Mn. Some form of beneficiation or upgrade is recommended to reduce acid consumption and reduce issues with LSS performance. Product options to recover Mn include $MnSO_4$, EMM, or EMD.

Flowsheet 1: limited or no Mn recovery.

- Pelletized ore - segregation roast 750°C - flotation - ship conc.

Flowsheet 2: limited Mn or no recovery.

- Roast - calcine CPS flotation or ore - CPS flotation - ship conc.

Flowsheet 3: Favourable technically & environmentally (no roast) recovers Ag, Cu, & Mn.

- Ore - pre-leach - reductive leach - Cu EW, impurity removal, Zn ppt, Mn recovery (Mn or MnO_2 EW or $MnSO_4$); Ag cyanide leach.

Flowsheet 4:

- Ore - HIMS - reductive acid leach - Cu EW, impurity removal, Zn ppt, Mn recovery (Mn or MnO_2 EW or $MnSO_4$); Ag cyanide leach.

Given the amount of testwork that has been completed over the years, the increased marketability for Mn metal and the effective reductive leach results obtained by KCA the generalized reductive acid leach flowsheet presented in Figure 13.9 is the basis for further testwork recommendations.

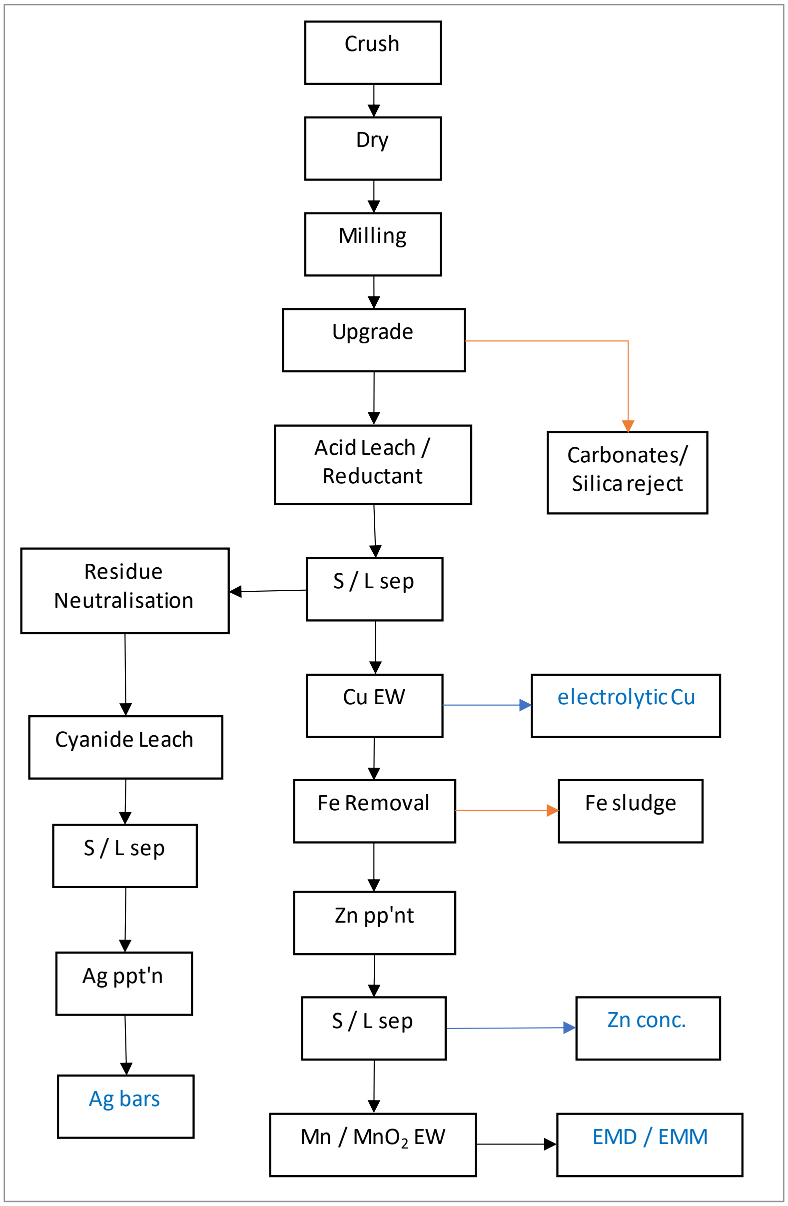
Most flowsheet components have been tested with reasonable success. The comminution and upgrade stages are less defined. These need to be defined to enable confirmation of downstream parameters. Liquid solid separation was very poor and requires extensive consideration given the number of separation stages required in the hydrometallurgical process route.

The links between resource, domain classifications and metallurgical variability require significant further work. These are a key focus for next stage.

The generalized flowsheet includes:

- Comminution
- A form of ore upgrade whether by HIMS, ore sorting, or other
- Reductive acid leach using SO_2 or SMBS
- Liquid solid separation
- Residue cyanidation for Ag recovery
- Solution recovery of Cu by EW
- Impurity removal
- Zn recovery
- Mn recovery by EMD, EMM, $MnSO_4$, or combination thereof

Figure 13.9 Generalized reductive acid leach flowsheet



Source: Ausenco 2020.

13.16.2 Recommendations for further metallurgical testwork to advance the Project

The Issuer should:

- Explore ore classification domains that are linked to the target flowsheet.
- Develop a geometallurgical model to attribute ore characterization within resource model.
- Undertake the work outlined below to advance the Resource estimate.

13.16.2.1 Ore characterization of deposit

- Develop ore characterization composites based on domain classification.
- Conduct ICP head assay suite and extensive mineralogy including QEMSCAN, XRD, SEM, microscopic examination of mineral and gangue.
- Establish typical ore hardness parameters CWi, RWi, BWi, Ai on ore.
- Consider pre-concentration methods to establish feed stock characterization to downstream processing.
- Confirm characteristics of composites are in line with domain classification or adjust accordingly.

13.16.2.2 High intensity magnetic separation

- Conduct dry HIMS on ore characterization composites.
- Validate rejection of carbonates, silica, and metal recovery to establish feed for downstream testing.

13.16.2.3 Ore sorting

- Consider silica and carbonate rejection via ore sorting.

13.16.2.4 Establish target market for manganese product

- Engage in marketing study.
- Evaluate flowsheet options and conduct trade-off study.

14 Mineral Resource estimates

There are no current Mineral Resources to be reported for the Property.

15 Mineral Reserve estimates

There are no Mineral Reserves on the Property.

16 Mining methods

As there are no Mineral Reserves, this section is not required.

17 Recovery methods

As there are no Mineral Reserves, this section is not required. Potential recovery methods are discussed in Section 13.

18 Project infrastructure

As there are no Mineral Reserves, this section is not required. Logistics and infrastructure are discussed in a summary fashion in Section 5.

19 Market studies and contracts

As there are no Mineral Reserves, this section is not required.

20 Environmental studies, permitting and social, or community impact

As there are no Mineral Reserves, this section is not required.

21 Capital and operating costs

As there are no Mineral Reserves, this section is not required.

22 Economic analysis

As there are no Mineral Reserves, this section is not required.

23 Adjacent properties

There are no Adjacent Properties to discuss.

24 Other relevant data and information

There is not any additional information or explanation required at this time to make the technical report more understandable and not misleading.

25 Interpretation and conclusions

25.1 Overview

The Property in which the Berenguela Project is located is in the province of Lampa in the department of Puno in the Republic of Peru. The land position consists of 17 mining concessions for 7,357 ha, but the focus is on the Project which is a previously drilled deposit. While exploration and exploitation has been carried out at Berenguela dating back to colonial times, the work since 2004 forms the basis for any current evaluation. It is a somewhat enigmatic, complex deposit which is currently being considered a carbonate-replacement deposit. The silver-manganese-copper zinc mineralization lies at or close to the surface and has been drilled by a number of operators in recent times. Only the data gathered by Silver Standard, Valor, and Rio Tinto since 2004 is being considered current.

Aftermath has only recently taken operatorship and becoming familiar with the data and history. Drilling has consisted of both RC and DD with the majority of the drilling being RC. This method had known issues with poor recovery in early campaigns. A small number of holes were twinned and results were mixed.

25.2 Risk and uncertainties

25.2.1 Geology

No significant risks and / or uncertainties have been identified that cannot be mitigated by a validation exercise and redrilling strategic holes or redrilling a portion of the deposit.

The geological understanding of the deposit needs to be enhanced through data mining, mapping, validation, drilling, and geometallurgical characterization. This will involve Aftermath geologists relogging core prior to planning programs and most importantly investigating issues with the old data. Fundamental tools such as a 3D geological model are required for the deposit and there are old underground workings for which the quantity and implications will have to be worked into any block model and estimation. This work will be designed to establish a Mineral Resource and reduce risk.

The data collection, sampling, sample preparation, security, and analytical procedures adopted by Silver Standard, Valor, and Rio Tinto for their exploration programs in part fell short of accepted industry standards. There were particularly issues in the early programs. The 2004 data represents 15% and the 2005 data represents 38% of the meters drilled. This will be mitigated by replicating some holes using large size core and a triple tube core barrel to enhance recovery.

25.2.2 Metallurgical

The complexity of the Berenguela process mineralogy has been demonstrated over the years of historical metallurgical testing. Silver minerals are shown to be encapsulated in the manganese mineral matrix. Pre-concentration and extraction via reductive acid leach have demonstrated acceptable extractions of Cu, Mn, and Ag. However, the variability across the resource and corresponding metallurgical response is not understood. The source of test samples is not clear, the mineral domain classifications are not proven, and hence attributing mineralogy and metallurgical response is yet to be developed. These are considered key risks. The mineralogical, geometallurgical understanding of the deposit needs to be enhanced to enable integrating the metallurgical response. This will be mitigated by a structured mineralogical characterization and metallurgical testwork program.

25.3 Conclusion

The QPs conclude that based on the information gathered to date, further exploration is warranted on the Property. However, there is a major data validation exercise requirement to be carried out to either validate the 2004 and 2005 RC drilling or replicate it in part or wholly. There is also exploration potential both at depth and two targets adjacent to the deposit for evaluation.

26 Recommendations

The following recommendations are made by activity. Many are in regard to operational improvement and data quality and thus their costs are part of the recommended exploration program. The exploration component is costed below as are other discrete items.

As noted in the report there are issues with data collected in 2004 - 05 and some of the proposed work will be contingent on an investigation into the sample collection during that period.

26.1 Historical drilling

Prior to any investigative work or new drilling, the QP recommends:

- Procurement of appropriate CRMs and blanks material.
- Develop comprehensive QA/QC procedures incorporating appropriate insertion rates for CRM, blank, field duplicates, coarse duplicates, and pulp duplicates.

To verify the validity of the 2004 drilling results:

- Search the historical data for records of poor drilling conditions, poor recovery, contamination, wet samples.
- Compile recovery information (weights) and plot against grades, and evaluate impact.
- Identify drillholes with problematic intervals and remove from future Mineral Resource databases.
- For drillholes with no apparent sampling issues:
  - Complete a campaign of additional twin drilling on remaining 2004 drillholes to assess whether that data is reliable. This will enable assessment of 2004 sampling protocols.

For all other drilling programs:

- Complete additional twin drillholes.

For all historical drilling with rejects and pulps available:

- Submit a subset of samples to laboratory for analysis.
- CRMs and blank samples and duplicate requests should be included with all submissions.
- Pulp samples will provide assessment of the original laboratory accuracy.
- Precision can be assessed by requesting multiple samples (i.e., duplicates) be taken from coarse reject and pulp materials.
- Duplicate samples of coarse reject material will provide check on whether samples were appropriately homogenized at the time of original processing.
- Duplicate samples of pulps will enable an assessment of pulp homogenization.

26.2 Geology and drilling

- Create consistent terminology for detailed mapping and logging of lithology, structural, alteration, and mineralization.
- Improve the geological understanding of the deposit, with additional detailed mapping of lithology, structural, alteration, and mineralization.
- Build a 3D lithology and structural model.
- Relogging selected core and RC chips incorporating consistent codes and description criteria compatible with the mapping.
- Rent more spacious premises in Lima so that the RC samples can be sorted and inventoried.

- Procure new topography by flying a Lidar survey.
- Continue using large diameter (HQ or PQ) triple tube diamond core to maximize sample size and core recovery, minimizing the loss of clay material.
- Drill twinned diamond core holes of selected existing RC holes to test recovery and sample volume effects between the two drilling methods and verify the RC data.
- Review the available 2015 bulk density data and determine a strategy for collection of density data in Aftermath's drilling programs, including a QA/QC regime. It is recommended that the full immersion wax method be used.
- Record and confirm the collar location of holes whose marker had been damaged. It is a viable task to find these as the locations are recognizable despite the reclamation. It would require some shallow excavation after locating a reference point based on the database coordinates.

26.3 QA/QC

The following is recommended to improve confidence in the sampling and analytical procedures:

- Purchase CRMs at the approximate cut-off grades, average grades, and higher grades of the deposit.
- Include CRMs in every batch of samples submitted at a rate of at least 1 in every 20 samples (5%).
- Ensure that CRMs are monitored in real time on a batch-by-batch basis, and that remedial action is taken immediately as issues are identified.
- Adjust CRM monitoring criteria such that assay batches with two consecutive CRMs outside two standard deviations, or one CRM outside of three standard deviations are investigated, and if necessary re-analyzed.
- Ensure CRM warnings, failures and remedial action are documented (i.e., table of fails).
- Use a certified blank material suitable for all economic elements and ensure insertion rates are at least 5%.
- Incorporate the use of pulp blanks into future QA/QC programs to facilitate the assessment of contamination during the analytical process.
- Ensure the insertion rates for duplicates is approximately 5% relative to total number of samples taken.
- Insertion of coarse reject and pulp duplicate samples.
- Duplicate samples be selected over the entire range of grades seen on the Project to ensure that the geological heterogeneity is understood. However, most duplicate samples should be selected from zones of mineralization. Unmineralized or very low-grade samples should not form a significant proportion of duplicate sample programs as analytical results approaching the stated limit of lower of detection are commonly inaccurate, and do not provide meaningful assessment of variance.

The QP recommends that if historical pulps are available in the areas of the current Mineral Resource, that umpire sampling be completed. Umpire samples should comprise 5% of total samples originally submitted.

26.4 Metallurgical testwork

- Explore ore classification domains that are linked to the target flowsheet.
- Conduct ICP head assay suite and extensive mineralogy including QEMSCAN, XRD, SEM, microscopic examination of mineral and gangue.
- Develop a geometallurgical model to link the resource database variability to metallurgical performance variability.

- Develop ore characterization composites based on domain classification.
- Establish typical ore hardness parameters for major ore classes / types.
- Consider pre-concentration methods to establish feed stock characterization to downstream processing.
- Confirm characteristics of composites are in line with domain classification or adjust accordingly.
- Conduct dry HIMS on ore characterization composites.
- Validate rejection of carbonates, silica, and metal recovery to establish feed for downstream testing.
- Conduct sufficient variability test work to validate the geometallurgical model.
- Consider silica and carbonate rejection via ore sorting.
- Engage in a marketing study.
- Evaluate flowsheet options and conduct associated trade-off studies to determine the most effective processing route.

26.5 Drilling and program costs

The program is discussed above, and the costs associated with items not included in general site operating costs are shown in Table 26.2.

In Table 26.1 there is a breakdown of the drilling costs. The program is set out with three elements: holes for twinning or replacement purposes, resource development drilling and exploration drilling of adjacent targets.

Table 26.1 Drilling program and costs

Year	Holes	Length	Holes	m	Cost $
Replacement and twinned holes	**Already drilled**		**Proposed**		
2004	57	5,393	14	1,348	404,475
2005	165	13,766	25	2,065	619,470
2017	69	8,465	7	847	253,950
					1,277,895
Resource development drilling			25	3,000	900,000
Exploration drilling on new targets			6	720	216,000
Total drilling cost					2,393,895
Rounded					2,400,000

The next phase of metallurgical testwork, to compliment development of the resource should focus on process mineralogy, geometallurgy and include flowsheet development pre-concentration and prove up the optimum manganese recovery method. This sets the path forward to further develop the hydrometallurgical flowsheet and overall recovery in the subsequent testwork phase. It is estimated this initial phase of work will cost approximately C$0.8M. This does not include the cost of drilling to obtain sample.

Table 26.2 Cost summary

Item	**Cost US$**
Geological mapping and supervision	100,000
Reassaying pulps and QA/QC	150,000
IP survey	100,000
Lidar survey (Topography)	50,000
Drilling	2,400,000
Follow up metallurgical testing	800,000
Resource estimate and reporting	100,000
Total phase 1	**3,700,000**

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28 QP certificates

CERTIFICATE OF AUTHOR

I, John Morton Shannon, P.Geo., of Vancouver, British Columbia, do hereby certify that:

1 I am currently employed as Principal Geologist with AMC Mining Consultants (Canada) Ltd., with an office at Suite 202, 200 Granville Street, Vancouver, British Columbia V6C 1S4.

2 This certificate applies to the technical report titled "Berenguela Silver-Copper-Manganese Property Update", with an effective date of 18 February 2021 (the "Technical Report"), prepared for Aftermath Silver Ltd. ("the Issuer").

3 I am a member in good standing of the Engineers and Geoscientists British Columbia (Registration #32865) and the Association of Professional Geoscientists of Ontario (Registration #0198), and a member of the Canadian Institute of Mining, Metallurgy, and Petroleum. I am a graduate of Trinity College Dublin in Dublin, Ireland (BA Mod Nat. Sci. in Geology in 1971). I have practiced my profession continuously since 1971 and have been involved in mineral exploration and mine geology for over 40 years since my graduation from university. This has involved working in Ireland, Zambia, Canada, and Papua New Guinea. My experience is principally in base metals and precious metals. I have both been Chief Geologist at Dome Mine in Ontario and Porgera Mine in PNG.

I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

4 I have not visited the Berenguela Property.

5 I am responsible for Sections 2-6, 8-9, 11, 14-24 and parts of 1, 7, 10, 12, and 25-27 of the Technical Report.

6 I am independent of the Issuer and related companies applying all of the tests in Section 1.5 of the NI 43-101.

7 I have not had prior involvement with the property that is the subject of the Technical Report.

8 I have read NI 43-101 and the section of the Technical Report for which I am responsible has been prepared in compliance with NI 43-101.

9 As of the effective date of the Technical Report, to the best of my knowledge, information, and belief, the section of the Technical Report for which I am responsible contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: 18 February 2021
Signing Date: 25 February 2021

Original signed and sealed by

John Morton Shannon, P.Geo.

General Manager / Principal Geologist

AMC Mining Consultants (Canada) Ltd.

CERTIFICATE OF AUTHOR

I, Marcelo Antonio Batelochi, MAusIMM (CP), of Prado, Brazil, do hereby certify that:

1 I am currently employed as an Independent Consultant with MB Geologia Ltda, with an office at Avenida Amazonas, 2904, Prado - Loja 512, CEP 30411-186 - Belo Horizonte / MG – Brazil.

2 This certificate applies to the technical report titled "Berenguela Silver-Copper-Manganese Property Update", with an effective date of 18 February 2021 (the "Technical Report"), prepared for Aftermath Silver Ltd. ("the Issuer").

3 I have a BSc (Honors) School of Geology, UNESP, São Paulo State University, Brazil and am a chartered Professional of the Australasian Institute of Mining and Metallurgy (AusIMM). My experience includes geologic positions of increasing responsibility at Rio Tinto, Vale S.A., Ferrous Resources Limited, and Great Panther Mining. I have 30 years of experience in the identification and resource evaluation for gold, iron ore, manganese, copper, nickel, bauxite, rare earth elements, and platinum group metals in mainly in South America and subordinary in Africa.

I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

4 I have visited the Berenguela Property for a site inspection on the 9 – 10 December 2020 which included the Berenguela deposit and the Limon Verde core facilities. The Chorrillos storage building in Lima was inspected on the 11 December 2020.

5 I am responsible for parts of Sections 1, 7, 10, and 12 of the Technical Report.

6 I am independent of the Issuer and related companies applying all of the tests in Section 1.5 of the NI 43-101.

7 I have had prior involvement with the property which included visits from 30 January to 2 February 2017 (due diligence for Valor Resources); 03 – 08 August 2017 (due diligence on the 2017 RC drilling); 20 – 23 November 2017 (consolidation of database, QA/QC and modeling) and 10-13 April 2018 (support for Valor Resources during the Rio Tinto due diligence). I also authored the report titled "Technical Report and Updated Resource Estimate on the Berenguela Project", dated 8 February 2018.

8 I have read NI 43-101 and the section of the Technical Report for which I am responsible has been prepared in compliance with NI 43-101.

9 As of the effective date of the Technical Report, to the best of my knowledge, information, and belief, the section of the Technical Report for which I am responsible contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: 18 February 2021
Signing Date: 25 February 2021

Original signed by

Marcelo Antonio Batelochi, MAusIMM (CP)
Independent Consultant
MB Geologia Ltda

CERTIFICATE OF QUALIFIED PERSON

Gregory Searle Lane

I, Gregory Searle Lane, FAusIMM, certify that:

1. I am employed as a Chief Technical Officer with Ausenco Services Pty Ltd ("Ausenco"), with an office address of 144 Montague Rd, South Brisbane, Queensland, Australia.
2. This certificate applies to the technical report titled "Berenguela Silver-Copper-Manganese Property Update", with an effective date of 18 February 2021 (the "Technical Report"), prepared for Aftermath Silver Ltd. ("the Issuer").
3. I graduated from University of Tasmania with a MSc.
4. I am a Fellow of AusIMM, No. 203005.
5. I have practiced my profession for 40 years. I have been directly involved in metallurgy, process design and project management for numerous complex metallurgical projects.
6. I have read the definition of "Qualified Person" set out in the National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation to a professional association and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for those sections of the Technical Report that I am responsible for preparing.
7. I have not visited the Berenguela Property.
8. I am responsible for Section 13 and parts of 1 and 25-27 of the Technical Report.
9. I am independent of the Issuer as independence is described by Section 1.5 of NI 43–101.
10. I have had no previous involvement with the property that is the subject of the Technical Report.
11. I have read the NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.
12. As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the technical report not misleading.

Effective Date: 18 February 2021
Signing Date: 25 February 2021

Original signed by

Gregory Searle Lane, FAusIMM
Ausenco Services Pty Ltd

Appendix A
Significant drill intersections

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2004	BER-001	0	54	54	314	16.17	1.60	0.31
2004	BER-002	0	19	19	191	19.11	1.38	0.45
2004	and	24	35	11	4	14.17	1.54	0.24
2004	and	52	79	27	54	19.30	1.44	0.41
2004	and	84	91	7	23	9.74	1.07	0.24
2004	BER-003	0	24	24	177	13.66	1.12	0.40
2004	and	30	39	9	75	4.61	0.37	0.17
2004	BER-004	0	9	9	54	12.23	1.12	0.38
2004	and	12	23	11	117	18.29	1.18	0.56
2004	and	37	51	14	71	4.74	0.85	0.40
2004	and	58	65	7	50	12.79	0.66	0.45
2004	and	71	83	12	38	15.66	1.22	0.32
2004	BER-005	7	12	5	44	6.04	1.45	0.24
2004	and	13	19	6	79	13.68	0.96	0.46
2004	and	21	31	10	40	6.41	0.65	0.23
2004	and	33	38	5	331	15.76	1.01	0.42
2004	and	40	63	23	330	14.64	1.65	0.55
2004	and	79	98	19	66	17.36	2.01	0.40
2004	BER-006	1	6	5	25	5.56	0.51	0.16
2004	and	8	38	30	70	8.62	1.07	0.29
2004	BER-007				No significant values (NSV)			
2004	BER-008	16	23	7	165	15.91	1.13	0.42
2004	and	37	53	16	94	12.17	1.78	0.40
2004	and	75	80	5	67	17.42	1.49	0.43
2004	BER-009	5	20	15	73	11.57	1.34	0.25
2004	and	28	34	6	48	4.71	1.29	0.31
2004	and	40	46	6	343	20.07	0.66	1.27
2004	and	48	53	5	90	18.29	0.67	1.05
2004	and	58	82	24	98	12.13	1.01	0.64
2004	BER-010	0	15	15	55	21.67	1.71	0.29
2004	and	25	63	38	125	16.83	1.10	0.46
2004	BER-011	0	10	10	49	7.37	0.88	0.23
2004	and	12	56	44	106	14.52	1.54	0.39
2004	and	58	76	18	89	14.70	2.55	0.31
2004	BER-012	6	20	14	55	13.79	0.85	0.36
2004	and	23	66	43	191	12.59	1.98	0.35
2004	and	71	77	6	327	15.64	2.91	0.48
2004	BER-013	8	20	12	48	4.60	0.91	0.20
2004	and	49	67	18	45	8.23	1.00	0.22
2004	BER-014	0	16	16	41	10.56	0.94	0.39
2004	and	26	61	35	100	10.86	1.43	0.86

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2004	BER-015	0	53	53	92	11.50	1.21	0.48
2004	and	58	67	9	52	17.20	1.50	0.43
2004	BER-016	0	29	29	57	9.82	0.84	0.40
2004	and	32	39	7	94	13.92	1.07	0.34
2004	BER-017	2	20	18	110	12.04	1.57	0.36
2004	and	33	42	9	55	6.29	0.79	0.55
2004	and	50	60	10	167	14.49	0.77	0.74
2004	BER-018	6	13	7	69	5.67	0.53	0.32
2004	and	15	34	19	139	13.54	1.52	0.29
2004	and	43	69	26	107	14.84	1.01	0.42
2004	BER-019	0	10	10	105	12.45	1.03	0.43
2004	and	22	69	47	155	16.29	2.15	0.31
2004	BER-020	33	46	13	113	9.05	0.78	0.78
2004	BER-021	25	37	12	148	11.49	2.00	0.75
2004	BER-022	24	47	23	341	13.14	0.55	0.86
2004	and	52	63	11	121	9.57	1.92	0.46
2004	and	65	80	15	54	10.49	0.87	0.36
2004	BER-023	43	60	17	256	12.76	1.14	1.13
2004	BER-024	26	31	5	1685	19.81	2.64	1.02
2004	and	33	51	18	291	11.58	1.62	0.62
2004	BER-025	28	41	13	83	16.18	1.18	0.84
2004	and	48	63	15	226	14.21	2.61	0.75
2004	and	87	95	8	59	16.02	0.79	0.60
2004	and	103	110	7	34	3.63	1.02	0.23
2004	BER-026	42	61	19	56	9.01	1.28	0.54
2004	BER-027	44	66	22	78	10.61	1.40	0.65
2004	and	69	79	10	107	12.17	1.55	0.51
2004	and	84	97	13	73	7.73	1.99	0.32
2004	and	102	112	10	44	12.03	2.11	0.34
2004	BER-028				NSV			
2004	BER-029	23	36	13	108	11.17	0.89	0.85
2004	BER-030	10	55	45	174	11.22	0.62	1.16
2004	and	58	77	19	23	4.92	0.69	0.69
2004	and	96	103	7	220	4.38	0.72	0.50
2004	BER-031	22	29	7	196	1.10	1.71	0.34
2004	and	38	46	8	181	0.27	0.84	0.20
2004	BER-032	13	21	8	42	4.94	0.81	0.43
2004	and	38	80	42	54	5.15	0.70	0.64
2004	and	86	93	7	21	6.47	0.36	0.61
2004	BER-033	0	29	29	166	20.50	1.57	0.39
2004	and	35	46	11	62	2.80	1.29	0.14
2004	BER-034	0	21	21	185	23.36	1.11	0.38
2004	and	26	76	50	74	12.02	0.59	0.32
2004	BER-035	7	19	12	44	9.94	0.98	0.24
2004	and	35	63	28	88	19.10	1.23	0.33

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2004	and	67	79	12	131	1.66	0.74	0.10
2004	BER-036	0	32	32	189	10.69	2.28	0.53
2004	and	35	48	13	36	8.16	1.89	0.25
2004	BER-037	0	34	34	155	15.88	1.28	0.79
2004	BER-038	11	34	23	302	14.96	2.63	0.45
2004	and	76	83	7	77	0.88	1.09	0.04
2004	BER-039	1	13	12	84	7.81	1.72	0.45
2004	and	18	40	22	85	7.25	2.15	0.35
2004	and	42	52	10	227	14.76	1.75	0.54
2004	BER-040	6	38	32	565	16.41	1.48	0.58
2004	and	40	54	14	424	24.28	2.91	0.46
2004	and	57	66	9	144	6.10	0.85	0.26
2004	BER-041	14	32	18	180	8.58	1.00	0.44
2004	BER-042	5	35	30	448	11.76	0.77	0.28
2004	and	51	60	9	124	3.51	0.14	0.29
2004	and	77	88	11	116	2.22	0.33	0.17
2004	BER-043	4	43	39	115	10.90	0.85	0.23
2004	and	44	52	8	66	2.34	0.78	0.10
2004	and	61	68	7	70	2.40	0.67	0.11
2004	BER-044	19	36	17	330	16.31	1.60	0.44
2004	BER-045	0	49	49	131	17.09	1.85	0.43
2004	BER-046	0	47	47	235	17.02	1.28	0.54
2004	BER-047	7	45	38	477	16.20	1.04	0.88
2004	BER-048	6	62	56	403	18.28	2.27	0.55
2004	and	69	84	15	87	5.34	0.74	0.18
2004	BER-049				NSV			
2004	BER-050	11	27	16	101	12.24	1.56	0.66
2004	BER-051	0	13	13	63	8.73	0.63	0.31
2004	and	16	33	17	106	20.97	0.95	0.66
2004	and	35	41	6	48	5.66	0.98	0.24
2004	BER-052	0	13	13	154	26.54	1.04	0.80
2004	and	15	26	11	159	4.72	0.60	0.14
2004	BER-053	0	15	15	116	29.46	1.01	0.79
2004	and	19	40	21	71	13.16	0.89	0.37
2004	and	49	54	5	83	1.04	0.20	0.10
2004	BER-054	0	6	6	86	16.77	1.16	0.74
2004	and	8	21	13	27	4.23	1.16	0.15
2004	and	39	62	23	82	8.07	0.59	0.39
2004	BER-055	0	26	26	123	13.22	1.23	0.61
2004	and	75	80	5	181	1.33	0.14	0.10
2004	BER-056	2	36	34	67	15.89	1.22	0.53
2004	and	39	54	15	471	11.09	1.06	0.33
2004	and	59	77	18	128	17.87	1.40	0.35
2004	and	86	91	5	78	7.46	0.55	0.28
2004	BER-057	0	24	24	55	8.54	1.26	0.52

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2004	and	26	33	7	215	4.69	0.62	0.36
2005	BER-058	0	14	14	46	23.08	1.08	0.43
2005	and	16	31	15	174	8.24	2.18	0.29
2005	BER-059	0	12	12	94	24.31	1.07	0.33
2005	and	27	48	21	270	1.96	0.97	0.09
2005	BER-060	0	37	37	140	14.53	1.10	0.52
2005	BER-061	0	7	7	111	3.02	0.86	0.23
2005	and	11	16	5	98	0.87	0.24	0.05
2005	BER-062	0	14	14	294	12.48	1.03	0.41
2005	and	24	42	18	51	3.54	0.52	0.14
2005	BER-063	0	9	9	225	7.28	0.70	0.23
2005	and	11	18	7	287	10.38	0.96	0.40
2005	and	20	26	6	71	15.38	1.17	0.33
2005	BER-064	0	20	20	138	11.01	0.98	0.31
2005	BER-065				NSV			
2005	BER-066	0	6	6	126	1.88	0.49	0.11
2005	BER-067				NSV			
2005	BER-068	22	29	7	99	13.78	1.15	0.24
2005	BER-069	0	10	10	136	15.90	1.41	0.40
2005	and	13	19	6	84	17.86	1.10	0.59
2005	and	23	69	46	182	8.47	0.98	0.21
2005	and	73	79	6	80	2.08	0.26	0.10
2005	and	106	113	7	69	4.17	0.30	0.17
2005	BER-070	0	23	23	193	16.35	1.76	0.40
2005	BER-071	25	61	36	89	11.62	0.87	0.27
2005	and	63	80	17	98	8.71	0.61	0.36
2005	BER-072	14	33	19	90	15.43	1.06	0.32
2005	and	40	47	7	72	1.10	0.53	0.09
2005	BER-073	0	66	66	190	17.30	1.46	0.49
2005	BER-074	0	28	28	113	18.40	1.65	0.60
2005	and	31	37	6	76	2.61	0.61	0.19
2005	and	39	50	11	160	0.56	0.43	0.07
2005	BER-075	0	24	24	107	23.82	2.03	0.40
2005	BER-076	34	39	5	103	0.54	0.62	0.07
2005	BER-077	0	19	19	178	6.60	0.73	0.37
2005	and	21	38	17	64	6.49	1.68	0.20
2005	and	41	51	10	61	2.26	0.66	0.14
2005	BER-078	0	16	16	412	18.00	1.19	0.86
2005	BER-079	0	16	16	322	16.07	1.08	0.82
2005	and	18	40	22	223	10.47	1.37	0.27
2005	BER-080	1	50	49	135	17.63	1.16	0.48
2005	and	53	66	13	113	1.95	0.30	0.14
2005	and	71	76	5	112	8.06	0.49	0.44
2005	and	79	88	9	86	3.14	0.31	0.11
2005	BER-081	0	5	5	63	4.71	0.74	0.29

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	and	10	29	19	911	19.61	1.48	0.40
2005	BER-082	0	6	6	142	15.89	1.73	0.98
2005	and	10	20	10	215	3.38	0.69	0.21
2005	and	22	39	17	240	8.14	1.27	0.34
2005	and	41	57	16	77	2.24	0.78	0.12
2005	BER-083	0	19	19	132	8.38	1.66	0.39
2005	BER-084	1	7	6	68	9.04	0.53	0.50
2005	BER-085	0	39	39	422	13.82	1.45	0.48
2005	BER-086	12	19	7	201	7.43	1.13	0.31
2005	and	22	40	18	436	16.43	1.39	0.41
2005	BER-087	0	26	26	246	16.72	2.15	0.57
2005	BER-088	0	15	15	451	21.54	1.61	0.56
2005	BER-089	0	11	11	259	7.17	1.69	0.27
2005	BER-090	0	21	21	305	13.30	2.58	0.29
2005	BER-091	0	17	17	178	15.33	0.97	0.80
2005	BER-092	0	16	16	221	19.03	1.06	0.79
2005	BER-093	0	14	14	150	9.57	0.45	0.51
2005	BER-094	0	7	7	100	12.48	0.45	0.65
2005	BER-095	0	39	39	495	13.25	1.06	0.63
2005	and	41	50	9	1849	25.04	0.94	0.61
2005	and	55	62	7	255	1.87	0.11	0.09
2005	BER-096	2	19	17	59	4.86	0.75	0.33
2005	BER-097	17	28	11	120	13.86	0.93	0.78
2005	and	40	54	14	71	13.44	0.69	0.40
2005	and	67	73	6	75	3.04	0.92	0.17
2005	BER-098				NSV			
2005	BER-099	42	51	9	70	4.07	0.44	0.29
2005	BER-100				NSV			
2005	BER-101	0	9	9	78	5.90	1.13	0.31
2005	and	15	26	11	131	5.04	0.48	0.27
2005	BER-102	0	21	21	162	16.89	1.83	0.64
2005	and	24	42	18	66	3.35	0.97	0.22
2005	and	56	64	8	236	18.61	0.95	0.54
2005	and	74	99	25	305	24.10	1.34	0.70
2005	BER-103	0	21	21	137	10.71	0.78	0.50
2005	BER-104	0	23	23	100	8.32	1.31	0.35
2005	and	39	45	6	60	3.31	0.68	0.17
2005	and	57	79	22	110	16.41	1.01	0.50
2005	and	81	87	6	37	7.11	0.77	0.28
2005	BER-105	0	26	26	99	11.77	0.98	0.49
2005	BER-106	0	6	6	89	11.11	0.97	0.34
2005	and	8	16	8	148	13.57	1.03	0.41
2005	and	24	60	36	58	17.79	1.85	0.32
2005	and	68	75	7	45	13.40	0.68	0.34
2005	and	81	103	22	109	17.14	1.11	0.32

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	BER-107				NSV			
2005	BER-108	0	9	9	105	5.61	0.67	0.23
2005	and	11	21	10	310	12.38	1.05	0.36
2005	and	24	31	7	263	16.03	1.47	0.25
2005	and	36	72	36	130	19.09	2.72	0.18
2005	and	78	87	9	63	14.30	0.86	0.43
2005	and	91	96	5	74	14.11	0.65	0.56
2005	BER-109	1	48	47	180	8.11	1.10	0.27
2005	BER-110	0	7	7	70	6.05	0.46	0.48
2005	BER-111	9	20	11	59	11.00	1.34	0.93
2005	and	26	45	19	112	6.68	0.80	0.43
2005	and	74	79	5	63	5.58	0.92	0.31
2005	BER-112	13	29	16	45	5.24	0.98	0.29
2005	BER-113	4	42	38	59	3.51	0.96	0.21
2005	BER-114	14	19	5	143	5.66	1.39	0.38
2005	and	45	58	13	210	14.07	0.88	0.42
2005	and	60	67	7	221	10.71	0.75	0.54
2005	BER-115	0	12	12	40	12.01	0.38	0.30
2005	and	16	28	12	31	4.71	0.58	0.46
2005	and	30	40	10	28	3.48	0.68	0.26
2005	and	43	49	6	47	9.25	0.21	0.51
2005	and	59	73	14	326	18.13	0.79	0.70
2005	and	78	84	6	96	22.96	1.58	0.43
2005	and	86	96	10	96	11.75	0.85	0.32
2005	BER-116	7	20	13	139	11.72	0.58	1.20
2005	and	22	30	8	129	7.86	1.34	0.95
2005	BER-117	13	22	9	40	7.43	0.69	0.54
2005	and	31	37	6	38	1.89	0.64	0.14
2005	BER-118	12	19	7	79	5.75	1.20	0.33
2005	and	53	67	14	84	11.05	0.69	0.32
2005	and	92	117	25	128	9.74	0.88	0.48
2005	BER-119	23	31	8	53	9.67	0.77	0.65
2005	and	33	38	5	31	5.07	0.47	0.50
2005	BER-120	11	37	26	192	21.65	0.76	0.76
2005	and	45	52	7	119	27.79	0.90	0.62
2005	and	54	109	55	109	23.26	1.89	0.36
2005	BER-121	7	21	14	116	14.71	0.76	0.58
2005	and	24	76	52	243	18.15	1.74	0.34
2005	BER-122	18	38	20	240	12.47	0.83	1.13
2005	and	40	47	7	45	6.12	0.77	0.54
2005	and	66	76	10	225	12.29	0.76	0.69
2005	and	85	122	37	117	16.84	1.09	0.35
2005	BER-123	3	11	8	178	18.83	0.75	1.75
2005	and	13	35	22	56	8.89	1.16	0.88
2005	BER-124	12	35	23	208	20.36	1.40	0.43

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	and	37	82	45	132	18.86	1.70	0.30
2005	BER-125	15	22	7	41	14.92	1.32	0.36
2005	and	39	53	14	63	17.25	0.92	0.40
2005	and	91	96	5	72	10.44	0.68	0.51
2005	BER-126	0	24	24	154	14.85	1.25	0.47
2005	and	29	42	13	62	8.76	0.76	0.73
2005	and	60	65	5	127	9.75	0.96	0.53
2005	BER-127	0	12	12	82	11.33	0.97	0.47
2005	and	34	40	6	141	10.47	0.90	1.02
2005	BER-128	11	36	25	588	11.70	0.99	1.02
2005	and	57	65	8	1868	13.94	1.78	0.61
2005	BER-129	0	5	5	94	16.66	1.59	0.53
2005	and	15	30	15	394	8.85	1.28	1.02
2005	and	39	44	5	32	6.34	0.56	0.77
2005	BER-130	20	33	13	90	8.50	1.22	0.55
2005	BER-131	8	29	21	83	7.97	0.88	0.82
2005	BER-132	0	17	17	93	6.73	0.89	0.70
2005	BER-133	0	18	18	83	10.06	0.71	0.99
2005	BER-134	20	56	36	144	7.50	0.99	0.71
2005	BER-135	15	22	7	25	13.96	0.48	0.94
2005	BER-136	27	34	7	88	12.37	1.23	0.86
2005	BER-137	50	63	13	67	7.38	0.76	0.54
2005	and	65	78	13	50	11.74	0.55	0.73
2005	BER-138				NSV			
2005	BER-139	12	18	6	100	10.63	0.98	0.85
2005	and	22	27	5	83	17.70	0.84	1.35
2005	and	29	51	22	412	14.01	0.84	0.96
2005	BER-140				NSV			
2005	BER-141	38	61	23	109	9.63	1.19	0.93
2005	and	63	83	20	35	4.99	0.68	0.48
2005	BER-142	21	43	22	88	15.86	1.30	0.36
2005	and	58	74	16	89	3.81	0.44	0.16
2005	BER-143				NSV			
2005	BER-144	42	61	19	278	12.73	1.25	0.90
2005	and	67	80	13	27	3.98	0.68	0.31
2005	BER-145				NSV			
2005	BER-146	41	47	6	17	10.01	0.59	0.68
2005	and	56	117	61	86	15.36	2.38	0.44
2005	BER-147	0	12	12	50	4.22	0.59	0.54
2005	and	14	22	8	38	14.13	0.67	0.85
2005	BER-148	0	13	13	34	10.96	0.52	1.02
2005	BER-149	35	55	20	60	7.53	1.15	0.59
2005	BER-150	39	48	9	56	18.69	1.09	0.36
2005	and	51	66	15	41	8.12	1.47	0.23
2005	BER-151	32	92	60	133	15.77	2.54	0.46

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	BER-152	0	12	12	48	7.04	0.95	0.73
2005	and	24	55	31	751	16.64	1.39	0.59
2005	BER-153	0	5	5	30	2.49	0.78	0.23
2005	and	10	22	12	80	4.09	0.60	0.19
2005	BER-154	0	7	7	106	12.66	0.88	0.42
2005	and	10	19	9	50	3.87	0.96	0.20
2005	and	33	68	35	825	7.58	1.82	0.22
2005	BER-155	7	47	40	122	15.15	1.23	0.37
2005	and	53	61	8	20	1.84	0.87	0.14
2005	and	69	74	5	44	14.01	0.35	0.44
2005	BER-156	11	20	9	97	3.76	0.85	0.32
2005	and	56	68	12	40	16.63	0.56	0.82
2005	and	71	76	5	44	17.02	0.75	0.70
2005	BER-157	43	49	6	31	11.94	0.60	0.22
2005	and	55	70	15	26	13.18	1.06	0.28
2005	BER-158	47	58	11	97	12.94	1.45	0.86
2005	BER-159	59	77	18	72	10.01	1.18	0.51
2005	BER-160	42	71	29	59	10.66	1.35	0.49
2005	BER-161	31	50	19	68	11.74	1.61	0.54
2005	BER-162	57	72	15	31	3.13	1.12	0.19
2005	and	74	90	16	43	8.91	1.23	0.26
2005	and	97	119	22	57	5.47	0.89	0.20
2005	and	127	135	8	33	7.97	0.49	0.25
2005	BER-163	53	60	7	147	13.50	1.02	0.58
2005	BER-164	12	52	40	68	9.25	1.06	0.22
2005	and	66	75	9	102	11.94	0.74	0.34
2005	BER-165	0	9	9	138	16.62	2.63	0.53
2005	and	41	64	23	49	13.59	1.21	0.40
2005	and	67	93	26	79	11.82	0.87	0.42
2005	BER-166	66	85	19	90	9.69	0.80	0.45
2005	BER-167	33	42	9	50	14.65	1.82	0.22
2005	and	54	72	18	84	16.91	1.90	0.53
2005	and	74	80	6	36	8.21	0.82	0.28
2005	BER-168	0	20	20	55	4.07	0.61	0.16
2005	and	32	52	20	103	11.85	1.05	0.29
2005	and	54	62	8	74	10.98	1.81	0.22
2005	BER-169	6	25	19	73	12.31	1.43	0.26
2005	and	29	34	5	47	7.70	0.61	0.30
2005	and	37	47	10	64	11.23	0.77	0.28
2005	BER-170	26	35	9	62	6.44	1.73	0.21
2005	and	42	56	14	91	11.16	0.77	0.24
2005	and	63	72	9	177	1.56	0.52	0.09
2005	BER-171	4	13	9	57	11.20	0.69	0.38
2005	and	30	38	8	67	4.92	0.63	0.24
2005	and	40	45	5	71	9.68	0.75	0.34

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	BER-172	33	49	16	167	19.88	1.00	0.71
2005	BER-173				NSV			
2005	BER-174	25	67	42	41	13.10	1.26	0.50
2005	BER-175	19	30	11	99	11.38	0.72	0.39
2005	and	40	59	19	52	13.74	1.30	0.28
2005	and	67	98	31	69	13.51	1.67	0.42
2005	BER-176	2	10	8	69	13.14	0.88	0.45
2005	and	13	19	6	139	14.17	0.59	0.34
2005	and	68	73	5	75	4.70	0.66	0.28
2005	BER-177	11	25	14	45	8.76	0.43	0.30
2005	BER-178	11	22	11	56	6.10	0.90	0.23
2005	and	31	47	16	89	10.94	0.94	0.21
2005	and	55	60	5	118	7.40	0.58	0.25
2005	BER-179	9	14	5	51	3.83	0.72	0.17
2005	and	25	35	10	28	15.75	0.39	0.30
2005	and	57	82	25	146	7.08	1.08	0.53
2005	BER-180	16	33	17	177	13.13	0.69	0.36
2005	BER-181	17	30	13	29	14.15	1.50	0.39
2005	and	32	42	10	91	9.84	1.28	0.31
2005	BER-182	5	35	30	39	13.72	1.92	0.55
2005	and	48	59	11	49	3.91	0.61	0.25
2005	and	70	94	24	51	6.22	0.72	0.25
2005	BER-183	32	63	31	64	13.01	1.63	0.52
2005	BER-184	12	20	8	255	26.65	0.78	0.80
2005	and	30	35	5	60	2.15	0.58	0.15
2005	BER-185	11	17	6	164	3.31	1.08	0.43
2005	and	24	58	34	176	6.90	0.89	0.59
2005	and	61	70	9	54	2.99	0.82	0.30
2005	BER-186	3	23	20	151	4.62	1.23	0.55
2005	BER-187	37	46	9	37	8.45	0.89	0.61
2005	and	64	74	10	165	0.79	1.50	0.07
2005	BER-188	12	19	7	26	4.02	0.61	0.35
2005	and	30	83	53	90	6.26	1.10	0.59
2005	and	91	130	39	113	4.80	0.92	0.52
2005	BER-189	0	13	13	76	16.21	0.56	0.42
2005	and	67	73	6	45	4.55	0.56	0.45
2005	and	87	92	5	58	3.72	0.62	0.42
2005	BER-190	0	9	9	150	18.62	1.01	1.17
2005	and	12	21	9	69	15.57	0.69	1.04
2005	and	27	39	12	69	14.53	1.32	1.27
2005	and	43	69	26	84	7.29	0.99	0.62
2005	BER-191	1	16	15	58	4.10	0.81	0.29
2005	and	20	26	6	52	4.46	0.53	0.47
2005	and	28	33	5	66	3.77	0.39	0.43
2005	and	38	113	75	86	6.46	0.97	0.57

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	BER-192	2	90	88	49	3.27	0.83	0.29
2005	and	109	117	8	45	3.91	1.10	0.38
2005	BER-193	1	41	40	170	6.03	1.01	0.60
2005	BER-194	0	30	30	74	4.99	1.18	0.51
2005	BER-195	0	8	8	34	2.05	0.87	0.19
2005	and	20	46	26	78	8.13	1.66	0.69
2005	and	52	57	5	39	2.71	0.56	0.28
2005	and	97	106	9	115	2.37	0.68	0.24
2005	BER-196	14	46	32	100	7.05	1.33	0.56
2005	BER-197	0	9	9	44	4.14	2.37	0.22
2005	and	20	54	34	73	7.28	1.23	0.49
2005	and	88	95	7	37	4.14	0.95	0.24
2005	and	99	105	6	81	2.74	0.33	0.25
2005	BER-198	0	9	9	37	3.73	1.24	0.17
2005	and	13	18	5	28	2.45	0.91	0.15
2005	and	22	45	23	43	5.69	1.29	0.24
2005	BER-199	15	45	30	55	2.71	1.11	0.19
2005	and	56	75	19	48	3.98	1.07	0.30
2005	BER-200				NSV			
2005	BER-201	9	14	5	60	2.90	1.12	0.30
2005	and	16	41	25	148	6.13	1.87	0.51
2005	and	65	72	7	88	1.05	0.44	0.11
2005	and	75	90	15	170	3.55	0.44	0.40
2005	and	92	97	5	94	1.91	0.37	0.23
2005	BER-202	21	62	41	74	4.28	1.53	0.34
2005	BER-203	0	13	13	98	6.03	1.38	0.71
2005	and	15	21	6	54	4.21	0.93	0.57
2005	and	30	36	6	62	2.02	0.46	0.24
2005	and	45	50	5	54	3.58	0.64	0.51
2005	and	54	60	6	158	4.35	0.84	0.43
2005	and	75	85	10	131	2.57	0.29	0.23
2005	BER-204	0	16	16	86	6.75	1.97	0.74
2005	BER-205	13	41	28	101	4.50	0.90	0.50
2005	and	117	124	7	66	2.31	0.36	0.24
2005	BER-206	28	53	25	63	3.91	1.18	0.20
2005	and	65	80	15	55	6.03	1.19	0.25
2005	and	97	109	12	54	5.39	0.62	0.43
2005	BER-207	23	38	15	40	3.42	1.02	0.19
2005	BER-208	17	37	20	102	6.07	0.83	0.74
2005	and	41	46	5	252	6.04	1.06	0.69
2005	and	67	73	6	91	2.82	0.24	0.29
2005	BER-209	30	42	12	19	10.59	0.85	0.85
2005	and	47	54	7	25	4.68	0.61	0.36
2005	and	83	95	12	102	3.13	1.32	0.34
2005	BER-210	2	25	23	53	7.22	1.03	0.60

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2005	and	32	53	21	87	6.93	0.99	0.75
2005	and	56	68	12	56	10.12	0.87	0.86
2005	and	72	135	63	181	15.25	0.91	1.87
2005	BER-211	0	9	9	67	6.68	0.57	0.54
2005	and	25	32	7	102	12.24	0.26	1.01
2005	and	36	41	5	90	16.93	0.31	1.60
2005	and	43	59	16	68	4.40	0.73	0.93
2005	BER-212	1	7	6	109	17.83	0.36	1.16
2005	and	9	45	36	105	11.70	0.44	1.60
2005	and	51	60	9	68	1.52	0.55	0.35
2005	BER-213	1	9	8	36	2.58	0.97	0.31
2005	and	29	42	13	60	7.77	0.54	0.91
2005	and	57	64	7	84	9.01	0.53	0.77
2005	and	74	108	34	170	14.32	0.72	1.43
2005	and	110	143	33	419	16.42	0.94	2.11
2005	and	150	156	6	106	5.42	0.43	0.90
2005	BER-214	7	12	5	29	10.85	0.63	0.86
2005	and	19	39	20	46	10.61	0.43	1.42
2005	BER-215	11	20	9	40	6.61	0.75	0.77
2005	and	33	42	9	30	0.93	0.83	0.12
2005	and	44	50	6	28	1.91	0.74	0.22
2005	and	60	84	24	180	17.45	0.59	1.70
2005	and	108	124	16	152	8.62	0.81	2.41
2005	BER-216	0	11	11	188	7.82	0.72	0.61
2005	BER-217	5	15	10	60	7.84	2.49	0.32
2005	BER-218	0	54	54	93	6.39	0.81	0.65
2005	and	87	103	16	33	4.69	0.47	0.54
2005	BER-219	0	62	62	79	4.18	1.26	0.43
2005	and	66	95	29	214	12.87	1.60	0.36
2005	BER-220	0	9	9	226	4.90	1.10	0.55
2005	and	31	39	8	80	4.42	0.48	0.54
2005	and	44	51	7	100	0.93	0.38	0.07
2005	and	54	61	7	88	7.59	0.42	0.59
2005	and	91	103	12	26	6.72	0.40	0.58
2005	BER-221	0	6	6	84	2.54	0.58	0.29
2005	and	22	31	9	159	2.58	0.78	0.27
2005	and	38	83	45	283	4.36	0.54	0.49
2005	and	104	111	7	207	2.55	0.61	0.31
2005	BER-222	0	8	8	113	3.55	0.56	0.25
2010	BER-A-09				NSV			
2010	BER-B-10				NSV			
2010	BER-C-01				NSV			
2010	BER-C-01A				NSV			
2010	BER-D-03	6	13.5	7.5	81	3.96	0.57	0.43
2010	BER-E-12	31.7	41.15	9.45	62	3.83	1.67	0.13

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2010	BER-F-13				NSV			
2010	BER-G-15				NSV			
2010	BER-H-07				NSV			
2010	BER-I-11				NSV			
2010	BER-J-14				NSV			
2010	BER-K-05				NSV			
2010	BER-L-02				NSV			
2010	BER-M-16				NSV			
2010	BER-N-08				NSV			
2010	BER-O-04	39	64.5	25.5	85	9.48	1.33	0.78
2010	BER-P-06	3.5	26.85	23.35	44	10.75	1.00	0.33
2015	BED-001	0	36.5	36.5	169	7.22	1.24	0.38
2015	and	38.25	62.45	24.2	118	1.45	1.09	0.11
2015	BED-002	49.7	57.6	7.9	107	10.16	1.46	0.33
2015	and	61	70.85	9.85	165	9.19	1.11	0.31
2015	and	76	81.2	5.2	102	11.53	0.63	0.39
2015	and	86.9	116	29.1	111	9.00	0.68	0.45
2015	BED-003	29.5	54.7	25.2	160	10.17	0.80	0.80
2015	BED-003A	26.9	34.2	7.3	55	11.43	0.68	0.69
2015	and	37.6	51.5	13.9	43	9.02	1.04	0.68
2015	BED-004	9.9	24.6	14.7	97	11.63	1.37	0.26
2015	and	36.9	57.15	20.25	97	4.99	0.72	0.23
2015	and	68.4	80	11.6	90	1.35	0.55	0.11
2015	BED-005	6	32.4	26.4	65	6.02	1.12	0.55
2015	BED-006	28.2	151.5	123.3	79	11.09	1.17	0.35
2015	and	174.5	197.1	22.6	70	9.19	1.21	0.32
2015	and	205.8	212	6.2	139	2.52	0.29	0.16
2015	and	214.5	238.5	24	247	4.53	0.74	0.43
2015	BED-007	87.8	98.1	10.3	39	1.89	1.15	0.20
2015	and	104	109	5	33	1.78	0.69	0.17
2015	and	111.25	143.1	31.85	113	14.25	1.26	0.47
2015	and	146	159.1	13.1	43	5.41	0.94	0.28
2015	and	184.5	191.5	7	86	3.81	0.42	0.31
2015	and	197.45	221.1	23.65	130	4.06	0.59	0.36
2015	BED-008	63.8	70.7	6.9	24	14.02	0.47	0.55
2015	BED-009				NSV			
2015	BED-010	39.5	50.4	10.9	33	10.59	0.66	0.55
2015	and	52.7	61.05	8.35	12	11.70	0.42	0.52
2015	and	73.55	82	8.45	13	15.13	0.24	0.68
2015	and	93.15	106.2	13.05	62	6.49	0.96	0.41
2015	and	248.5	257	8.5	28	3.63	0.62	0.29
2017	BER223-17	33	42	9	53	4.98	0.68	0.57
2017	and	82	87	5	43	6.29	0.55	0.51
2017	and	113	132	19	34	3.97	0.54	0.41
2017	and	137	174	37	165	12.73	0.69	1.38

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2017	BER224-17				NSV			
2017	BER225-17	7	38	31	49	6.10	1.33	0.52
2017	and	40	67	27	37	10.28	0.92	0.89
2017	BER226-17	12	34	22	113	15.10	0.63	1.64
2017	and	36	45	9	53	8.85	0.68	0.75
2017	and	53	60	7	27	4.67	0.69	0.33
2017	BER227-17	2	25	23	196	10.19	1.17	0.80
2017	and	30	62	32	90	6.48	0.81	0.66
2017	BER228-17	4	36	32	79	9.11	0.99	0.80
2017	BER229-17	8	18	10	43	14.91	0.63	0.90
2017	and	20	25	5	32	10.46	0.74	0.56
2017	and	29	41	12	19	10.19	0.50	0.85
2017	BER230-17	1	42	41	71	11.37	0.95	0.72
2017	BER231-17	39	51	12	36	12.62	0.69	0.99
2017	and	57	63	6	25	3.98	0.52	0.34
2017	BER232-17	1	6	5	72	15.74	1.19	1.19
2017	and	30	37	7	20	8.65	0.45	0.62
2017	BER233-17	0	6	6	33	5.51	0.76	0.56
2017	BER234-17	0	17	17	37.3	5.95	0.82	0.56
2017	BER235-17	0	7	7	39	14.92	0.94	0.93
2017	and	19	28	9	22	12.59	0.53	1.30
2017	and	40	66	26	522	9.68	1.02	0.45
2017	BER236-17	0	6	6	125	8.79	0.51	0.55
2017	and	10	15	5	67	12.89	0.36	0.63
2017	and	20	44	24	94	8.82	1.26	0.34
2017	BER237-17	35	45	10	102	11.35	0.91	0.31
2017	and	66	71	5	140	9.02	0.68	0.58
2017	BER238-17	19	27	8	56	12.30	0.73	0.33
2017	and	30	36	6	109	3.56	0.52	0.16
2017	and	83	91	8	69	4.68	0.90	0.22
2017	BER239-17	31	56	25	124	9.32	1.06	0.27
2017	and	89	99	10	208	6.06	0.87	0.29
2017	BER240-17	26	33	7	403	9.75	0.77	0.26
2017	and	35	49	14	69	11.76	1.78	0.23
2017	BER241-17	20	48	28	139	6.21	0.82	0.19
2017	and	50	57	7	67	3.03	0.47	0.11
2017	BER242-17	18	34	16	154	10.01	1.19	0.91
2017	and	51	57	6	191	4.43	0.79	0.25
2017	BER243-17	0	5	5	49	7.70	0.63	0.54
2017	and	24	29	5	71	17.53	0.63	0.63
2017	and	32	78	46	222	16.37	1.65	0.31
2017	and	80	92	12	80	7.55	0.64	0.15
2017	BER244-17	0	6	6	32	2.23	1.18	0.27
2017	and	14	51	37	128	15.04	1.65	0.42
2017	and	56	64	8	209	2.21	0.95	0.11

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2017	and	86	101	15	39	4.47	0.64	0.14
2017	BER245-17	3	13	10	55	10.40	0.87	0.49
2017	and	20	34	14	186	9.83	1.07	0.71
2017	and	52	57	5	282	21.71	1.06	0.82
2017	BER246-17	10	17	7	117	18.57	1.15	0.66
2017	and	31	41	10	70	11.49	0.88	0.80
2017	and	59	75	16	591	9.78	1.76	0.37
2017	BER247-17	26	35	9	63	13.73	0.50	1.21
2017	and	42	51	9	115	11.29	0.88	1.02
2017	BER248-17	30	43	13	163	13.60	0.91	1.37
2017	BER249-17	36	51	15	145	10.06	1.86	0.64
2017	and	59	90	31	148	10.86	2.12	0.36
2017	BER250-17	29	34	5	354	11.51	1.68	0.56
2017	and	36	52	16	107	12.45	1.13	0.95
2017	BER251-17	0	56	56	248	13.38	1.85	0.79
2017	BER252-17	0	37	37	160	11.54	1.31	0.81
2017	and	76	82	6	27	3.67	1.00	0.28
2017	BER253-17	0	7	7	92	15.92	1.38	1.17
2017	and	9	21	12	85	6.58	1.22	0.49
2017	and	24	30	6	84	6.34	0.70	0.61
2017	and	35	40	5	69	3.69	1.11	0.34
2017	and	83	88	5	54	4.11	0.48	0.30
2017	BER254-17	0	34	34	93	9.12	1.08	0.68
2017	and	62	89	27	145	4.72	0.64	0.33
2017	and	91	103	12	47	2.23	0.49	0.18
2017	BER255-17	33	46	13	60	9.34	1.10	0.54
2017	and	49	70	21	94	11.89	1.39	0.60
2017	BER256-17	23	64	41	54	12.70	1.64	0.35
2017	and	66	71	5	41	12.15	0.80	0.69
2017	and	76	81	5	131	11.87	0.80	0.52
2017	and	86	92	6	25	5.17	0.50	0.30
2017	BER257-17	67	84	17	77.9	6.16	2.38	0.32
2017	BER258-17	41	48	7	115	15.55	0.58	0.86
2017	and	57	65	8	66	15.26	1.25	0.94
2017	and	68	87	19	73	10.24	1.33	0.58
2017	BER259-17	52	58	6	62	17.71	1.00	0.36
2017	and	63	89	26	51	6.41	1.15	0.20
2017	and	91	100	9	45	4.08	1.03	0.25
2017	BER260-17	5	16	11	76	4.42	1.02	0.30
2017	and	68	75	7	55	14.69	0.76	0.89
2017	BER261-17	0	15	15	255	18.49	1.90	0.42
2017	and	54	65	11	86	13.83	1.53	0.37
2017	and	73	81	8	51	8.35	1.08	0.44
2017	and	92	100	8	357	11.00	0.45	0.65
2017	BER262-17	64	86	22	89	12.62	0.88	0.76

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2017	BER263-17	0	15	15	125	13.09	2.48	0.29
2017	and	46	55	9	94	10.70	0.92	0.29
2017	and	59	85	26	59	18.22	1.38	0.29
2017	BER264-17	0	16	16	204	19.06	2.65	0.42
2017	and	25	50	25	82	11.41	1.04	0.35
2017	and	62	80	18	104	13.05	0.91	0.27
2017	BER265-17	3	9	6	637	16.99	1.21	0.89
2017	and	16	32	16	45	9.85	0.56	0.59
2017	and	36	46	10	62	3.88	0.83	0.23
2017	and	48	58	10	232	18.35	0.67	0.59
2017	and	61	74	13	165	17.16	1.85	0.60
2017	BER266-17	0	11	11	212	10.56	0.95	0.43
2017	and	49	66	17	124	14.84	0.79	0.43
2017	and	68	76	8	36	13.37	1.67	0.23
2017	BER267-17	0	8	8	85	12.91	0.93	0.50
2017	and	18	48	30	65	16.26	1.49	0.38
2017	and	52	85	33	82	14.89	1.62	0.28
2017	BER268-17	13	21	8	107	3.36	0.50	0.17
2017	and	71	122	51	54	10.07	0.94	0.32
2017	BER269-17				NSV			
2017	BER271-17	16	21	5	90	5.73	0.37	0.31
2017	BER272-17	18	100	82	135	14.72	1.31	0.33
2017	and	126	135	9	63	8.26	0.63	0.34
2017	BER273-17				NSV			
2017	BER274-17	28	42	14	174	8.00	0.87	0.28
2017	BER275-17	0	6	6	90	3.65	0.46	0.21
2017	and	21	51	30	128	12.55	1.50	0.39
2017	and	60	72	12	162	12.63	0.96	0.25
2017	and	74	91	17	133	6.51	0.72	0.17
2017	BER276-17				NSV			
2017	BER277-17	10	19	9	50	12.22	0.68	0.30
2017	and	25	34	9	75	6.11	0.52	0.22
2017	and	36	44	8	66	11.08	0.90	0.22
2017	and	64	94	30	69	15.94	1.60	0.47
2017	and	96	103	7	34	4.23	0.85	0.20
2017	BER278-17	12	17	5	57	6.01	0.73	0.23
2017	and	19	49	30	167	16.30	1.50	0.35
2017	and	51	67	16	55	12.91	1.06	0.34
2017	and	69	92	23	29	10.34	1.00	0.42
2017	BER279-17	15	43	28	48	12.11	1.74	0.22
2017	and	49	85	36	46	14.78	1.72	0.26
2017	BER280-17	13	20	7	71	6.49	0.94	0.21
2017	and	22	42	20	84	11.88	1.06	0.27
2017	and	48	58	10	74	17.07	2.31	0.28
2017	and	65	78	13	68	17.69	1.60	0.63

Year	Hole ID	From (m)	To (m)	Intersection length (m)	Ag (g/t)	Mn (%)	Cu (%)	Zn (%)
2017	and	81	111	30	45	10.03	1.38	0.26
2017	BER281-17	15	42	27	118	10.77	1.38	0.22
2017	and	70	78	8	35	14.19	1.08	0.33
2017	BER282-17	23	37	14	70	9.90	0.80	0.25
2017	and	42	68	26	49	10.64	0.95	0.29
2017	and	70	80	10	25	9.82	1.27	0.33
2017	and	91	99	8	122	7.96	0.70	0.55
2017	BER283-17	17	46	29	65	9.31	1.13	0.26
2017	BER284-17	27	35	8	76	12.79	1.00	0.23
2017	and	40	54	14	86	13.08	0.78	0.33
2017	and	70	82	12	42	6.24	1.10	0.40
2017	and	86	92	6	57	11.25	0.88	0.52
2017	BER285-17	15	33	18	84	14.80	1.57	0.32
2017	and	43	49	6	90	13.18	1.15	0.31
2017	and	54	102	48	54	13.35	1.65	0.27
2017	BER286-17	18	45	27	110	8.98	0.88	0.28
2017	and	62	83	21	91	11.60	0.82	0.29
2017	BER287-17	0	6	6	87	14.62	1.08	0.92
2017	and	8	23	15	79	7.16	1.67	0.58
2017	and	63	68	5	33	4.81	0.56	0.23
2017	and	76	86	10	88	2.41	0.43	0.21
2017	and	95	100	5	106	1.99	0.58	0.17
2017	BER288-17	0	32	32	168	5.24	0.74	0.33
2017	and	35	44	9	111	10.41	1.38	0.28
2017	and	46	90	44	123	8.95	0.94	0.31
2017	and	92	101	9	80	5.83	0.59	0.18
2017	BER289-17	0	5	5	156	2.91	0.56	0.14
2017	and	7	16	9	143	2.22	0.38	0.12
2017	and	28	61	33	170	8.88	0.89	0.31
2017	BER290-17	8	20	12	202	3.33	0.89	0.18
2019	19BERE0001				NSV			
2019	19BERE0002				NSV			
2019	19BERE0003				NSV			
2019	19BERE0004				NSV			

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